INSTITUTE *of* STATISTICS
Oxford

Bulletin Vol. 16 *Sept. & Oct., 1954* *Nos. 9 & 10*

THE STRUCTURE OF ENGINEERING EARNINGS

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This article, like that of June 1951, is based on figures of the earnings and hours of adult male workers in Federated firms.[1] *These figures (the latest of which are for June 1953) have been very kindly supplied by the Engineering and Allied Employers' National Federation; but the Federation is naturally in no way responsible for our interpretation.*

When the Federation first made the details of their earnings enquiries available to us, we considered that the material was of sufficient intrinsic interest to be presented descriptively; but now that we have later and far more detailed figures we are attempting a more analytical treatment of engineering earnings. Some of the new material, which is of a rather different character and requires extensive tabulation and calculation, we are hoping to analyse in a future article; and we are therefore not following our usual practice of generalising from our findings in a formal concluding section.

To put the present study into perspective, we begin with a survey of the development of the structure of wage rates as determined by national Agreements.

I. METHODS OF PAYMENT

(*a*) *Plain time rates*

Before the first world war, engineering wages were negotiated locally, and recognised time rates of wages for the various categories of workers gradually became established in the different districts—either by custom or agreement.[2] There was therefore considerable variation in the district rates. In the early years of the war so many claims were made in the different districts that it became necessary to adjust wages nationally. Under the National Wages Agreement of 1917 provision was made for arbitration on claims three times a year: uniform national increases, as well as particular district advances, were granted. The Agreement was terminated in 1920, but ever since then there have been national wage negotiations and awards.

From 1922 until 1948, each nationally negotiated addition to rates was uniform throughout the country, and the pattern of district rates was left undisturbed ' long after the original reasons for them had ceased to exist '.[3] In percentage terms, therefore, district differentials narrowed: in 1926, for instance, the average of fitters' rates in the lowest of 40 districts quoted in the *Abstract of Labour Statistics* was 23 per cent below that of the highest, but by 1947 the corresponding figure was 9 per cent; and since the wage agreement of October 1948, which for the first time established a national minimum rate, this differential has narrowed to about 6 per cent. By now, the principal districts where rates are appreciably above the minimum are London, Sheffield, South Wales, and Northern Ireland.

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[1] The coverage of these figures, which is very wide, is discussed in detail in Appendix A. About two-thirds of the workers in the engineering and allied industries are employed by Federated firms.

[2] See *Report on Collective Agreements between Employers and Workpeople*, vol. I, 1934, p. 220.

[3] Statement by Mr. Jack Tanner on behalf of the Engineering Unions before the Court of Inquiry into Engineering Wages, August 1948.

Fitters and labourers

The wage structure is based on the rates of fitters and labourers. Whereas in some other industries rates are nationally negotiated for a large number of occupations, in engineering there are even now only two such rates.[1] The wages of workers in most of the other occupations are related to those of fitters or of labourers, though only in a few cases by nationally-agreed money differentials above one or other of the negotiated rates. All rates fixed by national agreement are essentially minima, and nationally-agreed differentials may be disturbed or even inverted by firms paying more than the minima all round.

During the first war a bonus was granted to all workers in engineering to meet the increased cost of living. This bonus was originally intended to be a temporary supplement to wages; but conditions never returned to ' normal ', and the war bonus (subsequently rechristened the National Bonus) continued to be paid, although it was considerably reduced in 1922. We shall call the sum of the district (or basic) rate and National Bonus the ' effective ' rate.[2] The unions—particularly of course the Amalgamated Engineering Union—always urged that the National Bonus should be formally consolidated with the basic rate; however, it was not until 1950 that this was done—and then only for timeworkers. In Table I we show the changes in basic rates and National Bonus for timeworking fitters and labourers from 1914 to the present day. Although there has never been a uniform rate for either category, the rates given in the table are typical of the majority of districts; and it was such ' typical ' rates that were adopted as national minima in 1948. The level of the effective rate is given only at particular dates : from 1926 onwards, at those dates for which we have comparable earnings figures. We have given a figure for 1920 because this was the maximum level reached in the post-war boom, while the figure for 1926 still shows the full effect of the heavy reductions in 1921 and 1922—reductions not repeated during the slump of the 'thirties.

The money difference between fitters' and labourers' effective rates, shown in the penultimate column of Table I, has remained fairly constant until recently. A 12½ per cent bonus on earnings, granted in 1917, gave approximately 2s. more to fitters than to labourers; but this was withdrawn at the end of 1921. From then until 1950 the money difference between the rates was maintained virtually intact[3]; but in November of that year the minimum

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[1] Before 1948, national Agreements specified *changes* in the wages of 'all adult male workers' without differentiation, not mentioning the *levels* of fitters' and labourers' rates which in fact prevailed in the different districts; but since then national Agreements have specifically referred to the minimum levels of fitters' and labourers' rates.

[2] This term is adopted in preference to the term ' "actual" rate ' used in the previous article.

[3] The 44-hour week Agreement which came into operation at the beginning of 1947 had the incidental effect of giving the unskilled 1s. more than the skilled. The *hourly basic* rates were left unchanged, so that the *weekly basic* rates were reduced by 4s. 6d. and 3s. 6d. for skilled and unskilled respectively : the National Bonus being simultaneously increased by 4s. 6d. for both.

TABLE I. *Time Rates of Fitters and Labourers*

	Basic rate[1]		*National Bonus*[2]		*Effective rate*		Difference between labourers' and fitters' effective rates	Labourers' effective rate as % of fitters'
	fitters	labourers	fitters	labourers	fitters	labourers		
Position at July 1914	40/–	24/–	—	—	**40/-**	**24/-**	–16/–	60.0
Changes, 1914–17	+6/–[3]		—	—				+5.2
Position at March 1917	46/–	30/–	—	—	**46/-**	**30/-**	–16/–	65.2
Changes[4] *in* 1917 [4]	+6/–		+20/4½[5]	+18/4½			–2/–	+7.7
1918 [2]			+9/6¾					+3.4
1919[6]			+5/7½					+1.6
1920			+ /9					+1.7
Position at December 1920 ...	52/–	36/–	36/3¾	34/3¾	**88/3¾**	**70/3¾**	—18/–	79.6
Changes in 1921 [5]	—6/–		–9/9¾	–7/9¾			+2/–	–1.7
1922 [3]			–16/6					–6.5
Position at October 1926	46/–	30/–	10/–		**56/-**	**40/-**	–16/–	71.4
Change in 1927			+2/–					+1.0
Position at { *October 1928* ... *October 1931* ...	46/–	30/–	12/–		**58/-**	**42/-**	–16/–	72.4
Changes in 1935 [2]			+2/–					+0.9
1936 [3]			+3/–					+1.3
1937 [2]			+3/–					+1.2

Position at July 1938	46/–	30/–	20/–	66/-	50/-	—16/–	75.8
Changes in 1939			+2/–				+0.7
1940			+5/–				+1.6
1941 [2]			+8/6				+2.3
Position at July 1942	46/–	30/–	35/6	81/6	65/6	—10/–	80.4
Change in 1943[7]	+20/–		–14/–				+1.3
1944			+4/–				+0.8
1945	+4/6						+0.8
1946			+6/–				+1.0
1947	–4/6	–3/6	+4/6			+1/–[8]	+1.0
Position at January 1948	66/–	51/–	36/–	102/-	87/-	—15/–	85.3
Change in 1948			+5/–				+0.7
Position at December 1949 ...	66/–	51/–	41/–	107/-	92/-	—15/–	86.0
Change in 1950	(consolidation)			+11/–[9]	+8/–[9]	—3/–	–1.3
Position at June 1951				118/-	100/-	—18/–	84.7
Change in 1951				+11/–			+1.3
Position at May 1952 ...				129/-	111/-	—18/–	86.0
Change in 1952				+7/4			+0.8
Position at June 1953				136/4	118/4	—18/–	86.8

[Notes to Table I on following page

rates of fitters were increased by 3s. more than labourers',[1] and the latest settlement of April 1954 has again awarded fitters 2s. more than labourers—roughly a 6 per cent increase to each. In every other general national Agreement the money alterations have been the same for all adult male workers, so that as wages have risen the percentage skill differential has narrowed as shown in the last column of Table I.

The rates of workers in most other occupations are related to those of fitters or labourers in one way or another. Some differentials—for example, the patternmakers', the machine moulders', and the foundry labourers'—are now fixed by separate national Agreements with the appropriate unions, having previously been based on national ' understandings ' such as that now relating to the skilled loose-pattern moulders: earlier still, they were based on district understandings or agreements. To illustrate this type of relationship, we may take the patternmaker—a highly skilled craftsman—as our first example.

Patternmakers

The patternmaker's rate has always been higher than the fitter's, though it was not until 1937 that a uniform craft differential of 5s. above the fitter's rate was established nationally (Table II). This differential has remained

[1] These increases, however, were intended ' to establish improved minimum wage conditions ' and not to provide automatic additions to every worker's wages. The increase a worker actually received was related to the current level of his earnings. The effect of the Agreement on the average earnings of skilled and unskilled workers depended, therefore, more upon the respective proportions of these workers whose earnings were below specified levels (see p. 281, n. 1), than on the 3s. difference prescribed in the increases in their minimum rates.

Footnotes to Table I.

[1] The minimum district rates established for fitters and labourers under the Agreement of October 1948, have been taken as the basis on which to make the appropriate adjustments required by national Agreements so as to obtain comparable (modal) rates for other years. The rates shown in the table coincide with the fitters' rates calculated by the Confederation of Shipbuilding and Engineering Unions and submitted to the employers in 1948.

[2] From 1917 to the end of 1921, a bonus of 12½ per cent on earnings has been added to the National (War) Bonus in the table (see note 5).

[3] This is the approximate average of the changes that were negotiated piecemeal in the different districts during this period. The first national wage settlement was that of April, 1917.

[4] The changes shown are the net changes during the years in question. Where there was more than one change in a year, the number of changes is shown in square brackets.

[5] The increases in the National Bonus proper in 1917, 1918 and 1919 were 13/–, 8/6, and 5/– for both fitters and labourers—so that in December, 1920, the total National Bonus was 26/6 for each category. The reductions of 1921 were due to the withdrawal of the 12½ per cent bonus on earnings ; the National Bonus proper was not cut until 1922.

[6] The working week was reduced to 47 hours from January 1919, but the weekly rate remained unchanged.

[7] In 1943, 20/– was transferred from National Bonus to basic rate, and the reduced National Bonus was augmented by 6/–. The intention of this Agreement was to establish a new minimum level af earnings 6/– higher than the old effective rate in each district. Thus the full increase was to be granted only to those whose earnings (excluding individual merit payments and, of course, overtime earnings) were no higher than the old effective rate. If a man's earnings were already above the new minimum, he was not entitled to any increase at all.

[8] This change was due to the operation of the 44-hour week Agreement (see p. 273, n. 3)

[9] These increases in the national minimum rate (which had been established in 1948) were intended, like those of 1943, to be applied '*pro tanto* '. (See p. 281, n.1).

TABLE II

Composition of Effective Differential[1] *of Patternmakers over Fitters*

r=fitters' *basic* rate[2] R=fitters' consolidated rate[2]

	Craft differential	*Patternmakers' basic rate*	*Patternmakers' supplementary bonus* computation	*Patternmakers' supplementary bonus* amount	*Difference in National Bonus*[3]	*Patternmakers' total differential*
May 1937 ...	*+5/–*	r_1+5/–	—	—	*nil*	**+ 5/-**
July 1940 ...	*+5/–*	r_1+5/–	$\frac{25}{100}$ (r_1+5/–) —5/–	*+ 7/9*	*—2/–*[4]	**+10/9**
March 1943 ...	*+5/–*	r_2+5/–	$\frac{25}{100}$ (r_2+5/–) —5/–	*+12/9*	*—8/–*[5]	**+ 9/9**
April 1945 ...	*+5/–*	r_3+5/–	$\frac{25}{100}$ (r_3+5/-) —5/–	*+13/10½*	*—8/–*	**+10/10½**
Nov. 1946[6] ...	*+4/8¼*	r_4+4/8¼	$\frac{27\frac{1}{2}}{100}$ (r_3+5/–)	*+20/9¼*	*—8/–*	**+17/5½**
		Consolidated rate				
Nov. 1950 ...	*+4/8¼*	R +4/8¼	fixed at ...	*+12/9¼*	—	**+17/5½**

Note.—The total differential at any date remained unchanged until the next date shown. The only alterations in wages—other than those specified in the table—took the form of additions to the National Bonus, and these left the total differential unaltered. Under the 1950 Agreement the total differential was frozen in money terms at 17s. 5½d.

[1] *I.e.* the difference between the effective rates of patternmakers and fitters on timework.

[2] r_1, r_2, r_3, and r_4 in Column 2 represent the fitters' basic rates at the dates in question. For the appropriate levels of these rates and of R, see Table I.

[3] Difference between patternmakers' and fitters' National Bonus (see note 4).

[4] Under the 1940 Agreement, timeworking patternmakers received the pieceworkers' National Bonus (see Table III), instead of the timeworkers', because the supplementary bonus was paid nominally in lieu of piecework earnings (see p. 278). Since 1927 the pieceworkers' National Bonus had been 2s. less than that of timeworkers.

[5] By the National Arbitration Tribunal award of 1943, 20s. was transferred from the National Bonus to the basic rate for both timeworkers and pieceworkers; at the same time, 6s. was added to the timeworkers' National Bonus, but not to the pieceworkers'. The patternmakers' supplementary bonus was accordingly increased by 5s. (*i.e.* 25 per cent of the increase in their basic rate).

[6] Under the 44-hour week agreement, the *hourly* basic rate remained constant: thus $r_4 = \frac{44}{47}$ of r_3, and $4/8\frac{1}{4} = \frac{44}{47}$ of 5s.

It will be seen, however, that the patternmakers' supplementary bonus was not correspondingly reduced, and that it continued to be calculated on the basic rate applicable to the 47-hour week.

unchanged in hourly terms ever since, having been reduced in weekly terms to 4s. 8¼d. when the 44-hour week was introduced. However, in July 1940, as the result of a national Agreement between the Employers' Federation and the United Patternmakers' Association, a supplementary bonus was conceded for the 'war-time emergency and for the period thereof.' The bonus was fixed at 25 per cent of the patternmaker's basic rate,[1] less 5s.: so that the 5s. craft differential was apparently being given with one hand and taken away with the other. In fact, it was being replaced by a payment to timeworking patternmakers which was partly intended to recoup them for having to provide and maintain their own tools, but was also partly designed to compensate them for not being able to earn better money on piecework[2]—patternmaking being rather less suitable than other skilled trades for payment by the piece. After the war a further Agreement—effective from November 1946—increased the patternmakers' supplementary bonus to 27½ per cent of their basic rate,[3] without, however, any deduction of the 5s. craft differential. Thus for timeworking patternmakers the two principles—of compensation for not being on piecework, and of payment for superior skill—were now fully recognised. Table II shows, in detail, how the patternmaker's supplementary bonus was ultimately derived from the fitter's basic rate and how it, together with other elements, contributed to the effective differential of the patternmaker over the fitter. The consolidation of timeworkers' rates in November 1950 made it impossible to continue the existing method of calculating the patternmaker's effective rate; and since at this time the difference between patternmakers' and fitters' effective rates happened to have reached 17s. 5½d., it was fixed at this level. The distinction between the craft differential and the supplementary bonus is still preserved:[4] the 4s. 8¼d. was unaffected by consolidation, so that the supplementary bonus was fixed at 12s. 9¼d. With the fixing of this bonus in money terms, the patternmaker's effective differential over the fitter will of course narrow in percentage terms whenever the consolidated rate is increased.

Foundry workers

The rates of certain foundry workers are similarly determined by national Agreements between the Federation and the foundry workers' unions, or by national understandings. In 1953 the foundry labourer enjoyed a minimum differential of 2s. 9¾d. over the ordinary labourer, while the moulding machine operator and the machine moulder—both semi-skilled—had differentials of 6s. 1d.[5] and 9s. 10d. respectively over the foundry labourer. The skilled loose-pattern moulder enjoys a differential of 4s. 8¼d. over the fitter.[6] But although the rate of any single one of these categories is related either to that of the fitter or of the ordinary labourer by a system of simple money differences and not—as was the patternmaker's—by an elaborate combination of money and percentage differentials, the interrelation between the rates of the different categories is automatically disturbed if different adjustments are made to the parent rates by a comprehensive national Agreement. This is illustrated by Diagram I, which shows the impact of the 1950 Agreement on the structure of foundry workers' rates. Because fitters were granted 3s. more than ordinary labourers under this Agreement, the two implied differentials (*i.e.*, those of the loose-pattern moulder over the machine moulder and moulding machine operator) were increased by 3s.—thus disturbing established relationships within the foundry. If the machine moulder's rate had happened to be tied to the fitter's (as is the case with many semi-skilled workers) instead of to the labourer's, the implied differential of the loose pattern moulder over the machine moulder would not have been altered. Indeed, the repercussions of such an Agreement are rather arbitrary: it does not follow that, because it is desirable to widen the differential of the fitter over the labourer, the differential of the loose-pattern moulder over the machine moulder—two closely related occupations—should also be widened.[1]

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[1] *I.e.*, the fitter's basic rate plus the 5s. craft differential.

[2] 25 per cent of the basic rate was the 'piecework percentage' at that time (see p. 281).

[3] The 'piecework percentage' had been raised to 27½ per cent of the basic rate in 1943.

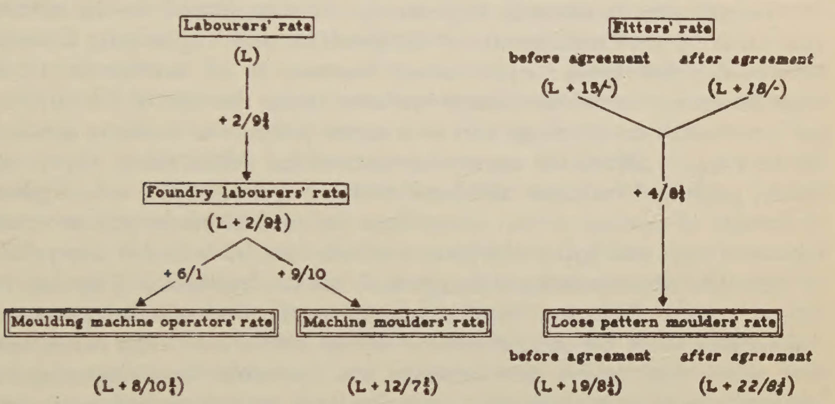
[4] This distinction is not purely nominal, since it affects the computation of overtime, shift, and holiday payments.

[5] After 6 months' satisfactory service; 4s. 2½d. initially.

[6] The odd levels of these differentials are due to their having been scaled down from round sums when the 44-hour week was introduced (*cf.* the patternmaker's craft differential).

I. **Foundry differentials**

Effect of general agreement of November 1950



Implied differential	before agreement	after agreement
Loose pattern moulders' rate minus moulding machine operators'	10/9½	*13/9½*
Loose pattern moulders' rate minus machine moulders'	7/0½	*10/0½*

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[1] The Agreement of April 1954 again widened all these differentials; but it was specifically designed to do so.

This type of problem is not, of course, confined to foundry workers. There are, moreover, certain semi-skilled workers 'whose rates at present are not definitely related to those of skilled and unskilled workers.'[1] (In these cases, the rate which the worker receives may depend upon the machine which he happens to be operating.) It is not clear how many of these workers there are; they were not mentioned in negotiations or Agreements before 1950—'these astral bodies, in mid-air, who do not belong to the fitter or labourer class, are a new one on me'[2], said the Directer of the Federation at this time. For these workers too, increases in rates which are not the same for fitters and labourers are bound to create difficulties, as there is no means of deciding which increase is applicable in particular cases.

General wage increases in engineering—now negotiated for the industry as a whole by the Confederation of Shipbuilding and Engineering Unions—have been of four types: equal money increases to all workers (by far the most common); equal percentage increases (as in the case of the 1917 12½ per cent bonus on earnings, and as was the practice in industry generally before 1914);[3] differential money increases to the skilled (as in 1950); and finally, graduated increases unrelated to skill but designed to secure greater uniformity of earnings within occupations (as prescribed by the *pro tanto* clauses of 1943 and 1950). All these methods may be defended as equitable in particular circumstances, although each has its drawbacks. The first two do not involve deliberate discrimination, but the first narrows percentage differentials while the second widens money differences. The third, however, which does involve discrimination, has inevitably—in a wage structure where almost all rates are directly related to those of fitters or labourers—bred fresh anomalies between other workers (possibly in the same shop) whose rates do not happen to be linked to the same parent rate.[4] The fourth, or *pro tanto* method, differs radically from the others in that it does not provide for automatic increases in wages to all workers. It is designed to eliminate fortuitous differences in the actual earnings of workers within particular occupations by limiting the increases to the lower-paid in each grade and withholding any concessions from those whose earnings are already above specified levels. Despite the equity, in theory, of such an arrangement, in

[1] Agreement of November 1950. This is apparently the first mention in an agreement of this category of workers.

[2] Sir Alexander Ramsay, at a special conference of unions and employers on September 20th, 1950.

[3] In 1926 the Balfour Committee drew emphatic attention to a feature which, they said, was 'clearly brought out' by the statistics at their disposal: 'the greater percentage rise in the wages of the unskilled as compared with skilled workers'. 'The figures show that, broadly, the money additions to the wage rates of the two classes have been roughly equal in amount; but, generally speaking, in pre-war times the wages of the two classes have moved, not by equal amounts but by equal percentages, and in this sense the movement of the last ten years has been relatively advantageous to the less skilled classes of workers. The change began early in the war and arose out of its necessities.' (*Committee on Industry and Trade, Survey of Industrial Relations* (1926), pp. 15–16.)

[4] The settlement of April 1954 was the first to cater for the semi-skilled, all of whom received an increase midway between those of the skilled and the unskilled.

practice it has proved highly unpopular : ' I think it is true to say,' remarked Mr. Jack Tanner, when introducing the 1951 wage claim, ' that the settlement [of 1950] has been the cause of more discontent among the workers, and hostility from them, than any wage settlement over the past twelve years. The chief reason, of course, was the fact that it did not provide for a general increase in wages.'[1] It provoked considerable unrest for a time in the form of embargoes on piecework and overtime.

(*b*) *Payment by results*

In engineering, it is clearly impracticable to maintain standard lists of agreed piecework prices (such as exist, for example, in cotton, steel melting, and boot and shoe manufacture) and to alter these merely by uniform percentage adjustments from time to time. Owing to the immense number of different processes and operations in so heterogeneous an industry, as well as to the rapidity of technical development, any general control over piecework earnings can be no more than minimal—a percentage relationship established by national agreement between the basic time rate and the least that a pieceworker ' of average ability ' may be expected to earn. This ' piecework percentage ' applies to workers on all forms of payment by results.[2] To safeguard the pieceworker from unduly low wages, he has always been guaranteed his time rate.[3]

By 1914 the general practice was to fix piecework prices so as to enable the average pieceworker to earn at least 33⅓ per cent over the appropriate time rate, and when the first national Agreement was signed the percentage was fixed at this level. It was, however, changed to 25 per cent in June 1931, to 27½ per cent in March 1943, and to 45 per cent in November 1950. The percentage has applied to the basic rate only, and never to the National Bonus. Although the basic rate was identical for pieceworkers and timeworkers (until its disappearance for timeworkers in 1950, on consolidation), the pieceworkers' National Bonus was 2s. less than the timeworkers' from 1927 to 1943 and 8s. less from 1943 to 1950. The expected minimum earnings of pieceworkers—a concept analogous to the ' effective rates ' of timeworkers and known as the Minimum Piecework Standard—comprise the basic rate plus the piecework percentage plus the pieceworkers' National Bonus; and the percentage by which the Minimum Piecework Standard exceeds the timeworkers' effective rate may be called the 'effective piecework differential'. Since the introduction of the National Bonus, the effective piecework differential has, of course, always been smaller than the piecework percentage.

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[1] Thus under the 1950 Agreement only those workers whose gross earnings per 44-hour week (excluding individual merit rates and craft and district differentials) were equal to or less than 117s. 2d. and 98s. for skilled and unskilled workers respectively were to receive the full increases. (These minima were the existing levels of the ' Minimum Piecework Standards ' which will be discussed in the following section.) Those workers whose earnings ranged from these minima to 128s. 2d. (skilled workers) and 106s. (unskilled) were to receive increases sufficient to bring their earnings up to these levels, while those whose earnings were already higher were not entitled to any increase. For pieceworkers as well as for timeworkers, the increases were on a ' *pro tanto* ' basis ; and the choice of the Minimum Piecework Standard for both categories was presumably made to avoid discrimination between them.

[2] The term ' pieceworker ' will therefore be used as equivalent to ' payment-by-results worker ' throughout, although in other industries—*e.g.*, furniture making—a distinction is sometimes made by the establishment of one standard for pieceworkers proper and another for those working on forms of P. by R. involving collective bonuses.

[3] *I.e.* the appropriate basic rate, plus the pieceworkers' National Bonus or its equivalent.

In 1950, when the timeworkers' rate was consolidated, it was decided that consolidation was not practicable for pieceworkers. The revised standard of 45 per cent was still applied to the previous basic rates of 66s. and 51s., and the pieceworkers' National Bonus of 33s. was replaced by a payment of 9d. per hour. This amounts to 33s. for a standard week of 44 hours, so that the change was purely notional. Timeworkers have received increases of 11s. and 7s. 4d. in their consolidated rates since the 1950 Agreement ; these increases have not been incorporated in the pieceworkers' basic rate, which has remained unchanged at 66s. : instead, they have been included in the hourly payment, which has been increased by 3d. and 2d. per hour successively[1].

Table III shows the composition of the Minimum Piecework Standard and the effective piecework differential for fitters from 1914 to May 1952. In the thirteen years from 1922 to 1935, the only change in timeworkers' effective rates was the 2s. increase in their National Bonus in 1927—an increase which, contrary to precedent, applied to timeworkers only. During the same period the only change in the Minimum Piecework Standard was due to the reduction in the piecework percentage in 1931. Thus, whereas in the slump of 1921–22 both pieceworkers' and timeworkers' wages were considerably reduced, in the boom of 1927–29 and in the subsequent depression pieceworkers lost ground heavily : between 1927 and 1931 their advantage over timeworkers was reduced by 5s. 10d. (see Table III, Column 6), and the effective piecework differential declined from 27.4 to 16.4 per cent (Column 7). From this point onwards the decline was due to the increases for both timeworkers and pieceworkers being about equal in money terms : in fact, they were identical under every Agreement except those of 1943, 1945 and 1950. Although under these Agreements pieceworkers gained, on balance, over timeworkers, the gain has been small—their Minimum Standard having risen by only 1s. 3d. more than timeworkers' effective rates during the twenty-two years since 1931. The above figures apply only to fitters; but the picture holds good for pieceworkers in other occupations—with the notable exception of patternmakers. For them, the granting of the compensatory bonus to timeworkers in 1940 had the effect of reducing the effective piecework differential from 14 to 6 per cent; and, while the increase in the piecework percentage in 1942 raised it slightly, it was reduced to zero in November 1946 when the compensatory bonus was increased to the same proportion of the basic rate as the piecework percentage.[2]

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[1] *I.e.*, in effect, the same increases as for timeworkers.

[2] In fact, the combined effect of this Agreement and of that relating to the 44-hour week (see Table II, n. 6) was that the Minimum Piecework Standard for patternmakers fell slightly below their timeworkers' guaranteed minimum. Nevertheless it was insisted in the 1946 Agreement that piecework prices and times should, in practice, be fixed in such a way as to provide an 'adequate incentive' to pieceworking patternmakers ; and in any case the timeworkers' guaranteed minimum was assured to the pieceworkers. The 1950 Agreement had the incidental effect of re-establishing an effective piecework differential of between ¼d. and ½d. per week, at which level it has since remained. These changes have to some extent been reflected in earnings.

TABLE III

Relation between Minimum Piecework Standard and Timeworkers' Effective Rates
(Fitters only)

		Composition of Minimum Piecework Standard				*Relation to Timeworkers' Effective Rates*		
		1 Basic rate	2 Pieceworkers' standard[1] addition	3 Pieceworkers' National Bonus	4 Minimum Piecework Standard	5 Timeworkers' effective rate[2]	6 Difference between cols. 4 and 5	7 Pieceworkers' effective differential (col. 6 as% of col. 5)
July	1914 ...	40/–	+13/4	—	**53/4**	40/–	13/4	*33.3*
Oct.	1926 ...	46/–	+15/4	+10/–	**71/4**	56/–	15/4	*27.4*
Oct.	1928 ...	46/–	+15/4	+10/–	**71/4**	58/–	13/4	*23.0*
Oct.	1931 ...	46/–	+11/6	+10/–	**67/6**	58/–	9/6	*16.4*
July	1938 ...	46/–	+11/6	+18/–	**75/6**	66/–	9/6	*14.4*
July	1942 ...	46/–	+11/6	+33/6	**91/-**	81/6	9/6	*11.7*
May	1945 ...	70/6	+19/5	+17/6	**107/5**	96/–	11/5	*11.9*
Jan.	1948[3] ...	66/–	+18/2	+28/–	**112/2**	102/–	10/2	*10.0*
June	1951 ...	66/–	+29/9	+33/–[4]	**128/9**	118/–	10/9	*9.1*
May	1952 ...	66/–	+29/9	+44/–[4]	**139/9**	129/–	10/9	*8.3*
June	1953 ...	66/–	+29/9	+51/4[4]	**147/1**	136/4	10/9	*7.9*

Note.—The dates selected (except for July 1914 and May 1945) are those for which we have earnings data. The selection shows every change since 1926 in the pieceworkers' standard addition and in the money difference given in column 6.

[1] *I.e.* the addition to the basic rate resulting from the application of the piecework percentage. This percentage was 33⅓ per cent from 1914 to June 1931; 25 per cent from then until March 1943; 27½ per cent until November 1950; and since then 45 per cent.

[2] As in Table I.

[3] The standard week was reduced to 44 hours from January 1947. The weekly basic rate was reduced in order to leave the hourly basic rate unchanged.

[4] *I.e.* 9d. per hour from November 1950, 1s. per hour from November 1951, and 1s. 2d. per hour from November 1952 (until 1954).

Pieceworkers' actual earnings depend, of course, on a vast number of particular piecework prices or times. These are settled by domestic bargaining and are subject to no national control except that implied by the application of the piecework percentage to the basic rate : ' piecework prices,' according to the national agreements, ' shall be fixed by mutual arrangement between the employer and the worker who is to perform the work '. The simplest way of adjusting the wages of pieceworkers is to alter the level of their National Bonus; for if either the basic rate or the piecework percentage is altered, the actual wage change must be effected by a corresponding revision of innumerable piecework prices and times[1]. This, of course, has been one of the reasons advanced by the employers against consolidation for pieceworkers. The abolition of the National Bonus—which is what consolidation implies—would destroy the simple mechanism for increasing pieceworkers' wages; the piecework percentage and the effective piecework differential would be identical, so that timeworkers' consolidated rates and the Minimum Piecework Standard would go up in the same proportion and the money gap between them would therefore widen. The unions agreed that in practice it would be virtually impossible to forecast how much more the employers would have to pay: ' you ' (the employers) ' say that you have studiously tried . . . . to safeguard yourselves against any possible development that there may be in regard to a pieceworkers' snowball as the result of altering the basic rate. . . . In our consideration of the general position, we have always appreciated that there is an intangible amount of money there. Once we start moving on the pieceworkers' position none of us can estimate it.'[2]

The National Bonus has therefore been retained for pieceworkers, in the form of the hourly payment. Its retention has not only avoided the above difficulties, but has also made it possible to follow the common practice of granting equal flat-rate increases to different categories of workers, thus narrowing percentage differentials in wages.

(*c*) *Overtime and shift premia*

While the main element in the worker's pay is, of course, his effective time rate or his piecework earnings as related to the Minimum Piecework Standard, he will often also be receiving additional payments in respect of long or inconvenient hours of work.

The standard working week was 47 hours from 1919[3] to the end of 1946, since when it has been 44. This standard week consists of three working days of 9 hours and two of 8½ or, very occasionally, of five days of 8 hours and one half-day (Saturday morning) of 4. Firms arrange their normal times of starting and stopping work on one or other of these schemes, and any work done outside these times must be paid for at enhanced rates. As in most other industries, overtime is calculated on a daily basis.[1]

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[1] See report of Special Conference of September 20th, 1950. The methods of paying pieceworkers vary from firm to firm, and the proportion of earnings due purely to piecework varies from worker to worker. There could therefore be no rule of thumb by which to increase existing piecework prices on consolidation, for a uniform percentage increase in all piecework prices would increase the earnings of different workers by different amounts and thus invite discontent.

[2] *Ibid*, p. 10.

[3] Before 1919, the standard week was usually of 54 hours.

A summary of the changes in nationally-agreed overtime rates is given in Appendix B. At present they are as follows: time and third for the first 2 consecutive hours of overtime, and thereafter time and half. Workers on a 5-day week are paid time and half for all hours worked on Saturday; and all workers are paid double time for Sunday work. The overtime premium—*i.e.*, the extra ' third ' or ' half ' paid—does not imply (as it does in shipbuilding) that earnings during overtime hours are raised by a third or a half, for the fraction is calculated only on the effective time rate.[2] Until 1950, this meant that the premia for pieceworkers were lower than for timeworkers, because for pieceworkers the effective rate (*i.e.*, basic rate + *pieceworkers*' national bonus) was 2s. lower than for timeworkers after 1926 and 8s. lower after 1943 (*cf.* Tables I and III); but this anomaly was rectified by the 1950 Agreement, under which all premia, for timeworkers and pieceworkers alike, were to be calculated on the new consolidated timeworkers' rates.

Shift workers are also paid at enhanced rates. Where double dayshift or 3-shift working is in operation, workers are paid for 44 hours while working only 37½; and workers not on these systems but working regular nightshifts are paid time and fifth. But shift working, although widespread in engineering during the war, to-day affects a very small proportion of the workers in the industry.

(*d*) *Supplementary payments*

We have now considered those elements in workers' earnings which are regulated to a greater or lesser extent by national agreement. There is, however, a wide variety of what may be called supplementary payments, sometimes settled by district agreement but usually by bargaining within the individual firm. These payments range from special allowances such as ' dirty money ' (for working in unpleasant conditions) to ' incentive ' payments of all types. Their importance has greatly increased during the last quarter-century.

The simplest of them is the individual merit rate. This, as its name suggests, is a payment (over and above the workers' nationally-negotiated rate) which is made in consideration of the quality of his work or of some special skill, aptitude, or experience. It may also be paid for good timekeeping, co-operativeness, or length of service with a particular firm. These individual merit rates are the only form of supplementary payment to be included—as are district and craft differentials—with the effective rate for calculation of overtime and shift premia. Similarly, in the wage negotiations of 1950 it was decided, following the precedent of the N.A.T. award of 1943, to exclude individual merit rates (together with craft and district differentials) from a worker's earnings before calculating the increase to which he was to be entitled under the *pro tanto* clause.

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[1] In a few industries, *e.g.*, boot and shoe manufacture, it is officially calculated on a weekly basis: *i.e.*, the full number of hours in the standard week has to be worked before any overtime premium is payable.

[2] Including, for this purpose, craft and district differentials and also individual merit rates.

Merit rates are, however, sometimes paid collectively to a group of workers, or to all workers alike in a particular shop or department such as the toolroom or a research department. In such cases merit rates could be regarded as quasi-craft differentials—where, for instance, there is considerable variation between different branches of engineering (or even within the same firm) in respect of the skill or quality of work required from workers in the same occupational category. A single comprehensive grading of occupations in so heterogeneous an industry would be a mammoth task,[1] and one possible justification of such merit rates is that they help to fill in, *ad hoc*, the bare outlines of the structure of nationally-negotiated rates. But such a justification is by no means valid in all cases where merit rates are ' commonly applied,' for the payment of such rates may represent no more than a method of raising wages in a particular firm by making ' above-minimum payments ' more or less indiscriminately.

Thus, although some ' commonly applied ' merit rates are genuine differentials based on a real difference of function, there is no unambiguous criterion by which these can be distinguished from mere ' above-minimum payments.' Therefore, in the 1950 negotiations, the unions—despite their contention that ' firms never give away something for nothing '—had reluctantly to agree with the employers that, as in 1943, ' commonly applied ' merit rates were not to be excluded from a worker's earnings when his *pro tanto* increase was being assessed. This decision amounted to a tacit agreement that differences in earnings arising from such payments ought, in principle, to be eliminated.

Another type of supplementary payment is the lieu rate or compensatory bonus. Unlike the merit rate, the lieu rate is confined to timeworkers, as it is intended as compensation to workers who are deprived of the opportunity to earn ' good money ' because the kind of work they do is not suitable for payment by results[2]. Patternmakers are a case in point : the timeworking patternmakers' supplementary bonus introduced in 1940 (which we have already discussed as contributing to their differential over fitters[3]) was partly ' of a compensatory nature ', and to this extent it is a unique example of a lieu rate fixed by national agreement. The methods of computing lieu rates or compensatory bonuses vary from firm to firm, and the patternmakers' supplementary bonus illustrates two of them : the fixed percentage of the time rate, and the flat-rate addition to earnings. However, the most common procedure seems to be to relate the bonus to the earnings of pieceworkers[1] and, where lieu workers and pieceworkers work in close collaboration, it may act as a form of indirect incentive payment. Where other methods of computation are used, the lieu rate is, in principle, purely compensatory.

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[1] Systematic job evaluation is much more advanced in the United States : *e.g.*, at the United Steel Workers' headquarters in Pittsburgh a complete library has been compiled of thousands of job classifications. This does not, however, prevent rates varying from plant to plant.

[2] However, to conform with the general tendency in engineering, it is explicitly stated in the patternmakers' Agreement of November 1946 that 'there shall be so far as practically possible an extension of the system of payment by results.'

[3] See p. 278 and Table II.

In fact, the frontier dividing timeworkers from pieceworkers is obscured by a great variety of payments--for example, ' a bonus scheme which relates the emolument to output or some other measuring rod of that kind, but not bringing the workpeople into the category of pieceworkers '[2]—that are more or less remotely related to the amount of work done. Under some schemes, the total piecework earnings of a group are distributed to each of its members in proportion to his time rate weighted by the hours he works (' distribution by rate '); under others, each worker is paid his basic time rate for the hours he works out of the total piecework earnings of the group—the remainder being distributed simply in proportion to hours worked ('equal bonus distribution ').[3] There are innumerable variants of such ' incentive ' payments at present in vogue,[4] although there seem to be no very obvious advantages from the point of view of incentive in systems where the bonus is paid on the output of a very large group (*e.g.*, the whole works); for the larger the group the less can individual effort affect the fluctuations of the bonus.[5] Some of these forms of payment are of a respectable antiquity : the Board of Trade Earnings Enquiry of 1906 described well over one-fifth of all engineering ' pieceworkers ' as paid on bonus systems as distinct from piecework proper.

Although, then, many timeworkers receive additional payments related in one way or another to output, and although part of the earnings of all pieceworkers is a flat-rate hourly payment, a distinction must be made in practice al(though national Agreements provide no criterion) between those workers to whom the Minimum Piecework Standard applies and those to whom it does not. The distinction, a purely pragmatic one, is based on the way in which a worker's earnings are calculated : where the bonus or payment by result is simply added to the worker's consolidated rate (as it is for lieu workers) he is called as a timeworker, but where such payments comprise the bulk of his earnings (apart from the flat-rate payment) he is classed as a pieceworker.

For timeworkers and pieceworkers—particularly for the latter—the concept of supplementary payments is somewhat academic, in as much as it may have little reference to the actual make-up of workers' earnings as shown on their clock cards. Some firms simply pay their timeworkers higher rates all round without making any distinction between the nationally-agreed minimum and the excess, and therefore without attributing this excess to merit or to anything else. As for pieceworkers, since there is no upper limit set to what they may earn, the excess of their earnings over the Minimum Piecework Standard[1] need not be ascribed to any specific supplementary payment at all. However, we are adopting the formal distinction between the nationally-agreed wage and the excess (or supplementary payment) because of its analytical usefulness in providing a measure of the extent to which, on average, firms pay their workers more than they are obliged to by national agreement. The distinction is, however, by no means artificial in all cases: in many firms, timeworkers' earnings are in fact composed of consolidated rate, lieu rate, merit rate, production bonus, etc., while many pieceworkers undoubtedly receive flat-rate supplementary payments of various types. In some cases such payments are used as a method of adjusting pieceworkers' earnings so as to correspond with increases already granted to timeworkers—even though an Agreement may have formally required employers to adjust their piecework prices or times. For example, in the Agreement of 1946 introducing the 44-hour week mention is made of ' outstanding cases where piecework prices or times have not been adjusted as a result of the transfer of 20s. from the National Bonus to the basic rate under the N.A.T. Award ' of 1943 : thus more than three years after this award there were still some firms which had not adjusted their piecework prices but had simply increased the flat-rate or ' out-of-office ' payments to piece workers by a corresponding amount.[2]

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[1] *Cf.* the text of many national Agreements, especially that of November, 1946.

[2] *Proceedings at Special Conferences*, etc., September 20th, 1950, p. 23.

[3] *Cf. Industrial Relations Handbook*, 1953, p. 185.

[4] The Trades Union Congress, in a statement in post-devaluation wages policy, recommended that ' a review should be made within each industry with a view to extending systems of payment by results over the widest possible range, relating wages to output '.

[5] For a criticism on psychological grounds of group bonus systems, see Norah M. Davis, *Some Psychological Conflicts Caused by Group Bonus Methods of Payments, British Journal of Industrial Medicine*, January, 1953.

Piecework prices are the result of countless domestic bargains; and, once the prices are agreed, their inviolability is guaranteed by national agreement unless a revision can be justified by a change in the ' material, means or method of production.' Any systematic attempt to rationalise the structure of piecework prices by means of time and motion study and job evaluation is bound to be difficult, not only because of the immensity of the task but also because of the suspicion with which some workers regard the man with the stop-watch. Needless to say, the ' scientific ' determination of piecework prices and times does not so much eliminate subjective assessments as formalise their operation; in practice, moreover, firms using these methods sometimes inflate the actual times taken by operations by incorporating excessive special time allowances—which correspondingly increase piecework prices.

[1] It seems reasonable to take the Minimum Piecework Standard as the effective minimum for pieceworkers, although strictly speaking their actual guaranteed minimum consists only of their basic rate plus National Bonus (now in the form of an hourly payment, see p. 282.).

[2] A few examples of the great complexity of wage calculation in practice, including ' prehistoric ' rates (where firms failed to consolidate as required by national agreement) and a large variety of special supplementary payments, were given in the D.Phil. thesis submitted by H. E. Shuman of New College in November 1952 (*Local and District Agreements in the Engineering Industry*), and now deposited in the Bodleian Library.

By thus ensuring high piecework earnings they hope to make certain of a good supply of labour. This point has been made in a recent report on the problems of measuring productivity:[1] 'a . . . serious problem encountered was the allowance added to build up the time standard to an attractive wage-earning level. This wage policy allowance was variable within each firm and was sometimes not even officially acknowledged as such, but was introduced to the time study rate as a ' padding ' to the time study engineers' speed and effort assessment or to any of the ancillary allowances mentioned. In fact, in the majority of firms, time study rates are not used as a standard of measurement but as a method of bolstering up a basic hourly wage to an attractive wage level, under the title of an incentive scheme.' There is little doubt that similar motives underlie many of the supplementary payments made to timeworkers. Some of the merit rates, lieu rates, production bonuses, etc., ostensibly paid to reward special abilities or to encourage additional output are merely a device for bidding up earnings during a period of labour scarcity.

II. RELATION OF EARNINGS TO RATES

> 'As it now stands the structure is almost completely fictitious and its sole value seems to be in presenting the confederation with entirely fanciful hard cases on which to base wage claims.'
>
> *Wages Structure in the Engineering Industry, Times Review of Industry*, January, 1954

Before examining in detail the patterns of earnings for workers in different occupations, regions, and types of engineering, we must first consider the general development of earnings in relation to rates—in particular, the growth over time of supplementary payments which now constitute so important an element in shaping these patterns.

Between January 1948 and June 1953 there was a substantial advance in earnings for every occupation of which we have details—most of the increases occurring after the wage ' thaw ' and with the impact of rearmament. Part of this advance resulted directly from increases in rates : for a 44-hour week, these did not exceed 35s. for skilled workers (whether on time or piecework) and 32s. for the unskilled (*cf.* Tables I and III). The average increases were, in fact, presumably lower, because of the '*pro tanto*' clause in the 1950 Agreement. However, the average weekly earnings of all workers included in the Federation enquiries increased from 139s. to 206s. : *i.e.*, by 67s., or virtually twice the maximum increase awarded by national agreement. Part of the extra 32s. was due to a lengthening of working hours; but since average hours worked rose only from 45.5 to 48.0 and average hourly earnings were about 4s. 3d. in June 1953, the longer hours—making full allowance for overtime premia—can hardly have accounted for much more than 14s. of weekly earnings. This still leaves a residual increase of at least 18s. not accounted for either by national wage agreement or by longer hours; so that the increase in average supplementary payments[1] during the period was equal to at least half the increase awarded by national agreement.

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[1] Joint Committee of the Institute of Production Engineers and of the Institute of Cost and Works Accountants, *Interim Report on the Measurement of Productivity* (December 1949), pp. 9, 10.

When supplementary payments assume this order of magnitude, it is essential to examine more closely the relative importance of the various components of weekly earnings (Table IV). Since only fitters and labourers were covered by the earliest of the Federation's enquiries, and since these are in any case the primary occupations in the rates structure, we shall at present confine ourselves to them. In analysing average weekly earnings we separate the pay earned during overtime hours[2] (Cols. e and j) from that earned during the standard week (Cols. b and g)—the latter being further split into effective rate (or Minimum Piecework Standard) on the one hand, and supplementary payments of all kinds on the other.

There was comparatively little overtime working before the rearmament boom of 1938–39; in the earlier years, short time is indicated by the negative entries. Overtime was, of course, at its peak during the war, when it accounted for about 20 per cent of earnings; in 1953—despite a shorter working week, an increase in overtime rates, the export drive, and the pressure of rearmament—overtime earnings ranged from 10 to 16 per cent. This percentage is usually higher for unskilled workers and timeworkers than for skilled workers and pieceworkers; for while the extent of overtime is in general at the employer's discretion, the lower-paid workers are presumably the most anxious to augment their earnings by offering to work long hours.

The development of supplementary payments requires closer examination. There is little *a priori* reason to believe that increases in these payments are closely associated with increases in nationally-negotiated rates. The only example of such a payment which we have found is the patternmaker's compensatory bonus, and that only between 1940 and 1950; but most compensatory bonuses are not linked with rates in this way—they are usually geared to pieceworkers' earnings or, like merit rates, are flat-rate additions. Nor, as we shall see (although the evidence is not conclusive) has there been in practice any general correspondence between increases in these payments and increases in rates.

Supplementary payments have increased almost continuously over the 27-year period: they are now considerably greater for pieceworkers than for timeworkers and over twice as great for fitters as for labourers. Table V shows that the rate of increase of these payments has been greatest during the two periods of rearmament. Owing however to the irregularity of the earnings enquiries we cannot say exactly when supplementary payments

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[1] Of this increase in average supplementary payments, about 1s. 6d. is attributable to the presence in 1953 of a bigger proportion of workers in those sections of the industry (notably aircraft and motor cars) where supplementary payments are highest. The effect of weighting changes of this kind on comparisons of average earnings may be substantial, but only over fairly long periods of changing industrial structure.

[2] The conceptual and practical difficulties involved in estimating average overtime earnings and average earnings for a standard week are discussed in Appendix B.

TABLE IV

Composition of Average Weekly Earnings of Fitters and Labourers[1]

	Timeworkers					*Pieceworkers*				
	Actual earnings	—of which:				*Actual earnings*	—of which:			
		earnings for standard work:			*overtime earnings*		*earnings for standard week:*			*overtime earnings*
		total	effective rate	supplementary payments			total	Minimum Piecework Standard	difference between g and h	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Fitters										
1926 Oct. ...	60/3	60/1	56/–	4/1	/2	73/4	74/9	71/4	3/5	*—1/5*
1928 Oct.[2]...	65/8	61/5	58/–	3/5	4/3	76/10	75/1	71/4	3/9	1/9
1931 Oct. ...	61/8	63/–	58/–	5/–	*—1/4*	70/4	73/1	67/6	5/7	*—2/9*
1938 July ...	81/6	73/9	66/–	7/9	7/9	93/4	87/2	75/6	11/8	6/2
1942 July ...	126/4	102/1	81/6	20/7	24/3	158/6	133/11	91/–	42/11	24/7
1948 Jan. ...	140/9	129/11	102/–	27/11	10/10	150/4	147/1	112/2	34/11	3/3
1951 June...	175/7	152/10	118/–	34/10	22/9	188/–	172/8	128/9	43/11	15/4
1952 May ...	196/5	170/3	129/–	41/3	26/2	210/5	190/11	139/9	51/2	19/6
1953 June...	208/7	180/11	136/4	44/7	27/8	226/1	203/11	147/1	56/10	22/2
Labourers										
1926 Oct. ...	44/6	42/11	40/–	2/11	1/7	53/–	54/9	50/–	4/9	*—1/9*
1928 Mar.[2]	48/–	44/8	42/–	2/8	3/4	56/–	53/1	50/–	3/1	2/11
1931 Oct. ...	44/2	44/10	42/–	2/10	*—/8*	49/4	51/9	47/6	4/3	*—2/5*
1938 July ...	60/3	54/–	50/–	4/–	6/3	66/2	62/8	55/6	7/2	3/6
1942 July ...	97/8	76/10	65/6	11/4	20/10	109/9	87/7	71/–	16/7	22/2
1948 Jan. ...	113/4	101/8	87/–	14/8	11/8	124/6	114/7	93/–	21/7	9/11
1951 June...	138/9	117/6	100/–	17/6	21/3	152/10	131/8	106/11	24/9	21/2
1952 May ...	153/6	130/6	111/–	19/6	23/–	169/6	145/7	117/11	27/8	23/11
1953 June...	163/4	138/–	118/4	19/8	25/4	178/7	153/4	125/3	28/1	25/3

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[1] For the method by which this table was calculated, see Appendix B.

[2] Note that the earnings data for the two categories were compiled in different months of this year.

TABLE V

Changes in Supplementary Payments for a Standard Week

No. of years	*Period*	*Average changes per year*				*As %[1] of corresponding changes in rates[2]*			
		timeworkers		pieceworkers		timeworkers		pieceworkers	
		fitters	*labourers*	*fitters*	*labourers*	*fitters*	*labourers*	*fitters*	*labourers*
5	Oct. 1926—Oct. 1931	+ /2	+...[3]	+ /5	*— /1*	45.8	*—4.2*	*—56.5*	20.0
6¾	Oct. 1931—July 1938	+ /5	+ /2	+ /11	+ /5	34.4	14.6	76.0	36.5
4	July 1938—July 1942	+3/2	+1/10	+7/10	+2/4	82.8	47.3	201.6	60.8
5½	July 1942—Jan. 1948	+1/4	+ /7	*—1/5*	+ /11	35.8	15.5	*—37.8*	22.7
5½	Jan. 1948—June 1953	+3/1	+ /11+	+4/1	+1/2	48.5	16.0	62.8	20.2
3½	Jan. 1948—June 1951	+2/-	+ /10	+2/8	+ /11	43.2	21.8	54.3	22.5
1	June 1951—May 1952	+6/8	+2/2	+7/11	+3/2	58.3	18.2	65.9	26.5
1	May 1952—June 1953	+3/1	+ /2	+5/3	+ /5	45.5	2.3	77.3	5.7
26¾	Oct. 1926—June 1953	+1/6	+ /8	+2/-	+ /10	50.4	21.4	70.5	31.1

[1] A minus sign indicates that supplementary payments were increasing while rates were decreasing, or *vice versa*.
[2] For pieceworkers, the Minimum Piecework Standards.
[3] Negligible.

rose most rapidly, but it is virtually certain that the biggest increase within any one year occurred during the war. Between 1938 and 1942 the earnings of skilled (and very probably also semi-skilled) pieceworkers ' ran away ' from timeworkers' earnings in a fashion not repeated during the recent armament boom.[1] But skilled pieceworkers, who had been asked for maximum production at virtually any price and benefited disproportionately from the long wartime runs, suffered the most when the conversion to peacetime needs entailed extensive recalculations of piecework prices and times. For while supplementary payments probably slumped for all categories at the end of the war,[2] by 1948 they had—in absolute terms at least—more than regained their 1942 level (even after allowance has been made for the reduction in the standard week) for all except skilled pieceworkers. The second part of Table V shows the relative importance of increases in supplementary payments and those awarded by national Agreements. Over the whole period, the increases in the supplementary payments of timeworking fitters have amounted to about half, and of pieceworking fitters to well over two-thirds, of what they secured by national negotiation—the corresponding figures for labourers being about one-fifth and nearly a third. But in the short run the ratio of changes in supplementary payments to national wage changes has varied very greatly.

Even though supplementary payments lie outside the orbit of national negotiation, it seems doubtful whether employers have been able, or even inclined, to reduce them : generally speaking, every successive increase in these payments has permanently widened the gap between rates and earnings. Nor has this gap widened only in money terms. Indeed, Table VI shows that for the past quarter-century the supplementary payments of skilled workers have risen proportionately more than their rates or Minimum Piecework Standards between each successive earnings enquiry (the only exception, of course, being for pieceworkers between the enquiries of 1942 and 1948).

TABLE VI

Proportion of Supplementary Payments in Earnings for a Standard Week

	Timeworkers[1]		*Pieceworkers*[2]	
	fitters	labourers	fitters	labourers
1926 October	7.3	7.2	4.8	9.5
1931 October	8.6	6.6	8.3	8.9
1938 July	11.8	8.0	15.5	12.9
1942 July	25.3	17.3	47.2	23.3
1948 January ...	27.4	16.9	31.2	23.2
1953 June	32.7	16.6	38.7	22.4

[1] For timeworkers, supplementary payments as percentage of effective rate.
[2] For pieceworkers, ' supplementary payments ' (*i.e.* the item in Column (i) of Table IV) as percentage of Minimum Piecework Standard.

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[1] It must however be remembered that for pieceworkers the concept of ' supplementary payments ' is less meaningful than for timeworkers (see p. 288), and that increases in these payments—as we define them—inevitably also include elements which are directly attributable to higher productivity.

[2] *Cf. A Note on Engineering Earnings*, BULLETIN, July 1951, p. 226.

On the other hand the supplementary payments of unskilled workers, after doubling relatively to rates between 1938 and 1942, have since then remained remarkably constant proportionately. These figures seem to support the suggestion that supplementary payments are particularly responsive to conditions of labour shortage ; for while unskilled labour was in really short supply only during the war, skilled labour has been scarce both then and during the recent rearmament and export drive.

We have suggested that increases in supplementary payments are not necessarily associated with increases in nationally-negotiated rates. Although this dissociation cannot readily be seen from the Federation data as their investigations have been too widely spaced, an indication of it can be obtained from the Ministry of Labour earnings enquires.[1] Diagram II shows the increases in hourly earnings over half-yearly periods from October 1948 to October 1953 for nine important types of engineering ranging from vehicles (where average earnings are highest) to agricultural machinery (where they are lowest), and for the industry as a whole—*i.e.* for all the 26 sections listed in Appendix A. During the period there were three increases granted under national Agreements,[2] and these have been separated in the diagram from the average increases granted by individual firms (*i.e.*, increases in supplementary payments).

Despite the wage freeze, hourly earnings rose fairly steadily in 1949–50—particularly in those sections of the industry where they were already highest; and in general the largest increases in supplementary payments occurred where there was no advance in rates. For the 9 sections shown, the biggest increases in these payments took place between April and October 1951 ; and, although sizeable increments might have been expected in any case as a result of the pressure of rearmament, those of 1951 were exceptional. These increases were probably associated with the widespread dissatisfaction concerning the *pro tanto* Agreement—the more especially as retail prices had begun to rise very steeply. The Interim Index had risen by 6 points between October 1950 and April 1951 ; it rose by a further 8 points between then and October, and by yet another 6 between then and the following April. Unrest broke out within a few weeks of the November 1950 Agreement, and the continued rise in prices probably led to an intensification of local wage pressure during the following months which was not checked until a further national increase—this time an equal advance all round, and the biggest ever awarded in the industry—had been secured in Novemeber 1951. After this, the rate of advance in supplementary payments subsided. The rate of change naturally differed between the various sections of the industry : it was greatest in those closely connected with armaments (aircraft and machine tools, where employment was expanding rapidly), as well

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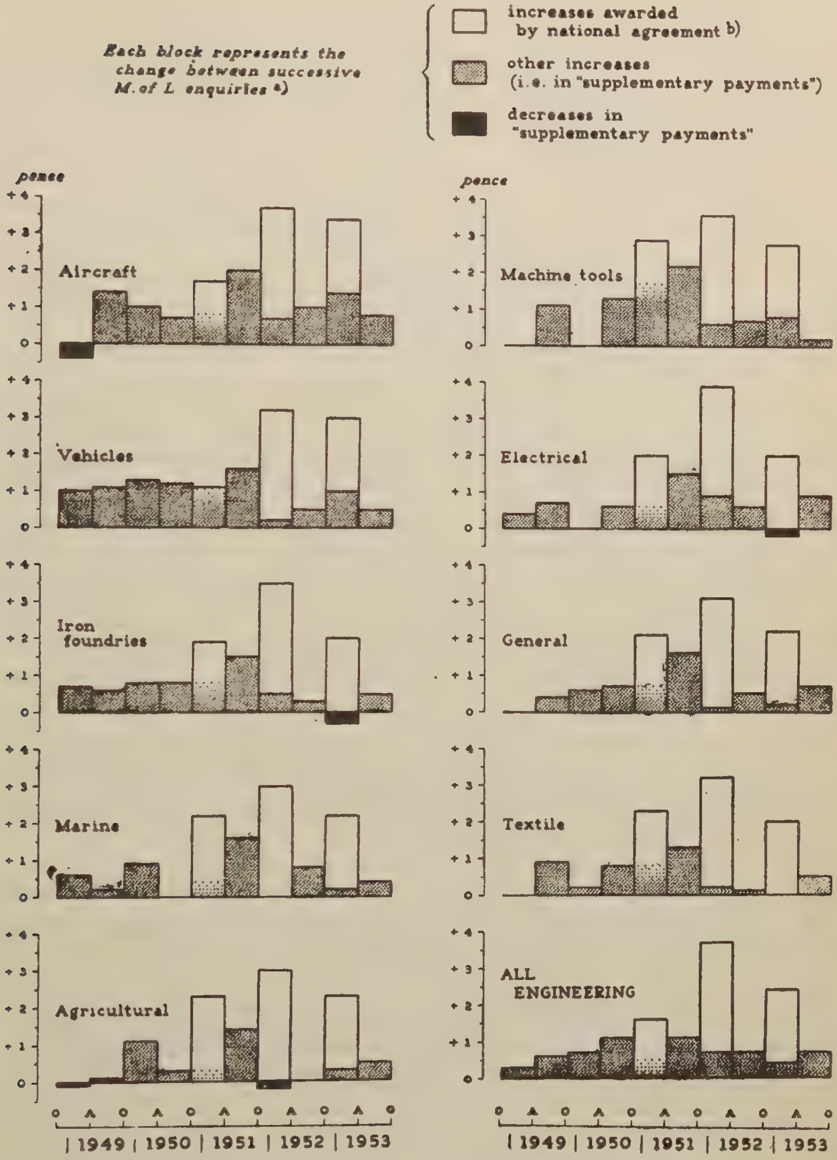
[1] The differences in coverage between the Ministry of Labour and the Federation data are analysed in Appendix A. The differences do not, however, materially impair the general argument.

[2] Crude and arbitrary estimates have had to be made of the average increases attributable to the *pro tanto* Agreement of 1950 (see note to Diagram II).

II. Changes in men's hourly earnings



(*a*) The names of the sections have, for convenience, been abbreviated; but they are easily identifiable from the list in Appendix A (*Electrical* refers only to 'Electrical Machinery', and *General* to 'Other Non-electrical Engineering'). It should be noted that *All*

[Footnote continued on following page

as in vehicles. In the latter section, the decline in output due to the sharp falling-off in the export market in 1951–52, and to the shortage of steel, was reflected in a distinct slowing-down in the rate of increase in supplementary payments; but this rate revived in 1953, when the steel shortage had eased and supplies of cars to the home market expanded very greatly. In fact, vehicles is the one case where changes in productivity[1] (in the sense of output per man-hour) appear to have been clearly associated with changes in earnings.

III. CHANGING STRUCTURE OF EARNINGS

> 'Earnings were not a measure of skill. The earning capacities of the workers were determined by the action taken in the individual workshops by the men themselves. . . . It was impossible to make any arrangements with Employers, by national or district negotiations, which would iron out the anomalies that existed in regard to the differences of earnings. Our job was to get new high minimums, and once those were obtained the people in the workshops knew how to improve upon those minimums.'
>
> Mr. J. R. Scott (A.E.U.) at 18th Annual Meeting of the Confederation of Shipbuilding and Engineering Unions, August 1953.

In our earlier articles we examined the principal differentials between the average earnings of workers in different occupations and grades of skill in relation to the structure of rates,[2] as well as the overall pattern of regional earnings (which we tentatively associated with the predominant types of engineering in the different areas). Since however our present information is not only more recent, but also more comprehensive in that we now have detailed figures of earnings in the different sections of the industry, we shall be able to carry our analysis much further. In each of the following sections we begin by examining and analysing the existing pattern of earnings (occupational, regional, or sectional), after which we give a short survey of how the pattern has developed.

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[1] We were able to examine this relationship for five types of engineering ; but it is hardly worth while showing the results as short-term productivity changes cannot really, on the evidence available, be measured with sufficient precision.

[2] For a discussion of some of the limitations of this procedure, see *Earnings in the Boot and Shoe Industry*, BULLETIN, February-March 1954.

Footnote to Diagram II continued

Engineering covers many more sections than those shown on the diagram, as it is based on all the 26 which are listed in Appendix A.

(*b*) While these increases were uniform under the Agreements of November 1951 and 1952, under the *pro tanto* Agreement of November 1950 they were graded for each individual according to the level of his earnings. As we have no distributions of individuals' earnings, we cannot say precisely what were the average increases under this Agreement. Since, however, the overall advances in earnings during the period in which the *pro tanto* Agreement occurred tended to vary inversely with the levels of earnings in the different sections, it seems reasonable to suppose that the average increases under the Agreement varied in this way. The maximum possible average increase (about 10s.) should have been granted only to workers earning no more than the pre-Agreement Minimum Piecework Standard (see p. 281, n. 1) ; and the minimum average increase almost certainly occurred in vehicles—the section with the highest average earnings—where we have assumed that it amounted to about 1s. of the overall advance of 4s. between October 1950 and April 1951. The average increases under the 1950 Agreement were then estimated for the other sections at various levels between 1s. and 10s. by linear interpolation, having regard to the levels of average earnings in those sections. Since however such estimates are necessarily arbitrary, no clear dividing line has been drawn in the diagram between the two components of the overall advance.

(*a*) *Differentials by skill and occupation, and by type of payment.*

Differentials in 1953.

In June 1953 the average weekly earnings of all workers in the skilled occupations selected by the Federation were about 25s. above those of the semi-skilled, the latter being about 30s. above those of the unskilled (Table VII).[1] However, the differences between the average weekly earnings of all workers in particular occupations or grades of skill provide only the crudest picture of differentials; for differences in hours worked and in the extent of piecework may have as great an influence on relative weekly earnings as have differences in actual hourly wages.

TABLE VII

Average Earnings by Grades of Skill, June 1953

Grade	*All workers*		*Timeworkers*		*Pieceworkers*	
	weekly	hourly[1]	weekly	hourly[1]	weekly	hourly[1]
Skilled	221/9	4.645s.	212/9	4.398s.	226/7	4.779s.
Semi-skilled	196/4	4.246s.	172/1	3.595s.	200/3	4.357s.
Unskilled	166/7	3.320s.	163/4	3.249s.	178/7	3.588s.
Skilled minus semi-skilled... ...	*25/5*	*0.399s.*	*40/8*	*0.803s.*	*26/4*	*0.422s.*
Semi-skilled minus unskilled ...	*29/9*	*0.926s.*	*8/9*	*0.346s.*	*21/8*	*0.769s.*

[1] No allowance has been made for overtime premia in calculating these figures, as this cannot be done for the semi-skilled, or for the skilled category as a whole.

Owing to differences in hours worked, differentials based on hourly earnings tend to be wider than those based on weekly earnings (see table in Appendix C); for there is, as we have already noted,[2] a tendency for pieceworkers to work fewer hours than timeworkers and, in general, for the highest-paid to work the shortest time. However, the semi-skilled workers are an important exception, as they have consistently worked shorter hours than the majority of skilled workers in every year for which we have figures. Again, the extent of piecework affects overall occupational and skill differentials since pieceworkers in the industry earn, on average, considerably more than timeworkers and the proportion of pieceworkers—which is 65 per cent among the skilled—is 86 per cent amongst the semi-skilled and only 21 per cent amongst the unskilled. As a result, differentials between the skilled and semi-skilled are wider for timeworkers and pieceworkers separately than for both together, while those between semi-skilled and unskilled are narrower. These effects are much the more pronounced for timeworkers.

However, even when full allowance has been made for these factors, and differentials based on average hourly or standard-week earnings are examined for timeworkers only, the relationships between the earnings of workers in particular occupations or grades of skill are often very different from those prescribed by national agreement. Timeworking labourers, whose consolidated rates in June 1953 were 18s. (*i.e.* 13 per cent) below those of fitters, were earning about 43s. (23 per cent) less than fitters per 44-hour week. Again, the minimum rate of loose-pattern moulders provides, as we have seen, for a differential of 4s. 8¼d. above that of fitters; but in 1951 and 1952 their average earnings on timework for a 44-hour week were the same as fitters', and in 1953 about 5s. below. The timeworking patternmakers' differential over fitters is 17s. 5½d.; but in 1948 their earnings for a 44-hour week were on average only 11s. 10d. higher, and it was only in 1952–53 that they achieved their intended money differential[1]—which they did by maintaining their lead in percentage terms (see Table VIII below).

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[1] The selected occupations are: *skilled*—toolroom fitters and turners; skilled sheet metal workers; loose-pattern moulders; turners and machinemen rated at or above fitters' rate; patternmakers; fitters (other than toolroom); platers, riveters, caulkers; *semi-skilled*—turners and machinemen rated below fitters' rate; *unskilled*—labourers. Detailed figures of average earnings and hours in each of these occupations are given for June 1953 in Appendix C.

[2] See p. 290 above, and BULLETIN for June 1951, p. 188.

Similarly, the difference between piecework and timework earnings often bears little relation to the effective piecework differential implied by national agreement (8 per cent for the skilled and slightly less for the semi-skilled and unskilled). The average hourly earnings of pieceworkers in our seven skilled occupations ranged from less than 1 to more than 20 per cent above those of the corresponding timeworkers; those of the semi-skilled (turners and machinemen) averaged over 21 per cent above; and those of the unskilled (labourers) over 10 per cent above. Of the skilled pieceworkers, patternmakers and toolroom fitters had the smallest advantage over their timeworkers; but these occupations are somewhat exceptional in that it is relatively difficult to pay them by results, and the proportion of pieceworkers is consequently lower than in any other skilled occupation. Timeworking patternmakers have, as we have seen, a supplementary bonus of a compensatory nature; and skilled toolroom workers have, similarly, a special guarantee under national Agreements by which their earnings are geared to those of skilled production workers (mostly on piecework)—and thus the most highly-paid timeworkers are found in these two occupations. The fact that pieceworking patternmakers and toolroom fitters have virtually no advantage over their timeworkers therefore reflects high time earnings and (for pattermakers) low piece earnings. Thus there is considerable variation in piecework differentials in average earnings between different occupations.

Moreover, as we have seen, there is considerable variation between occupations in the proportion of pieceworkers. This means that any overall piecework differential based on average earnings is bound to be misleading. In June 1953 the average hourly earnings of all pieceworkers covered by the enquiry exceeded those of timeworkers by more than 18 per cent. But as a much higher proportion of timeworkers than of pieceworkers are unskilled, the overall average of timework earnings tends to be depressed relatively to that of piecework earnings. If, in order to overcome this sort of difficulty, we take the various piecework differentials for each occupation and weight these by the appropriate numbers employed, we obtain an average piecework differential of only 13 per cent. This is a more meaningful figure; but it is still considerably greater than that implied by national agreement.

[1] In June 1951 the difference was 14s. 1½d., in May 1952 16s. 4d., and in June 1953 18s.9d.

Differentials in earlier years

We may now turn to examine the development over time of differentials in average earnings in the light of their relationship to those implied by national Agreements. Between 1926 and 1953, the skill differential based on the effective rates of fitters and labourers narrowed by 16 points. This narrowing has caused increasing concern to the A.E.U.: Mr. Jack Tanner has recently opposed further flat-rate increases on the grounds that 'it would not be in the best interests of the industry were the gap between the skilled and the unskilled rates to narrow still further,'[1] and the latest Agreement has accordingly provided, in effect, for a uniform percentage advance to all grades. But in terms of average earnings the skill differential has not closed very much. That based on timeworkers' average hourly earnings corrected for overtime (the figure most comparable with that based on rates) has narrowed by 5 points; while that based on pieceworkers' has narrowed by only 2. In fact, these differentials, which narrowed chiefly between the enquiries of 1942 and 1948, have actually been widening during the recent rearmament, as they probably did—for pieceworkers, certainly—during the early years of the war. Thus while the almost unbroken succession of flat-rate increases has resulted in an average contraction of the skill differential in rates of rather more than 1 point in every 2 years, the corresponding contraction based on timeworkers' average hourly earnings has been of only 1 point in every 5.

The development of occupational differentials can be examined in detail only since 1948 (Table VIII). We again eliminate the effect of hours worked and of different proportions of pieceworkers within occupations by using differentials based on hourly earnings for timeworkers and pieceworkers separately. While the differentials between the skilled (fitters) and semi-skilled have remained virtually unchanged, and those between the skilled and unskilled have—as we have seen—widened only slightly, there have been appreciable shifts in occupational differentials within the skilled grades.

These shifts have been largely confined to pieceworkers—particularly loose-pattern moulders and patternmakers (the structure of whose wages we have already examined), and sheet metal workers. All these categories have lost ground during the past five years. The earnings of pieceworking loose-pattern moulders rose sharply between 1948 and 1951, by which time they had become the highest-paid category of all, and this was probably due to an exceptional shortage of labour in the occupation.[2] But their supremacy was short-lived: their hourly earnings remained virtually static between 1952 and 1953, their differential over fitters falling by 6½ points during the year. This drop, which also affected timeworking moulders to some extent, seems to have been associated with a partial recession in found-

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[1] *Report of Special Conference* (unions and employers), July 21st, 1953.

[2] Returns made to the Ministry of Labour of unemployment and vacancies outstanding indicate that during this period the greatest occupational shortage in engineering occurred among skilled moulders. Indeed, with the important exception of fitters, there was a fairly close correspondence between labour scarcity and increases in earnings.

Table VIII

Occupational Differentials

	Average hourly earnings[1] *as percentage of fitters'* (italicised figures based on nationally-negotiated rates[2])							
	timeworkers				pieceworkers			
	1948	*1951*	*1952*	*1953*	*1948*	*1951*	*1952*	*1953*
Skilled occupations :								
Toolroom fitters and turners ...	116.9	116.1	115.7	116.3	108.5	105.3	105.8	106.0
Sheet metal workers	103.3	104.7	105.0	103.7	116.2	111.0	110.3	110.4
Loose-pattern moulders	98.7 *(104.6)*	100.0 *(104.0)*	100.0 *(103.6)*	97.3 *(103.4)*	110.9 *(105.5)*	113.1 *(105.3)*	111.7 *(104.9)*	105.1 *(104.6)*
Turners and machinemen rated at or above fitters' rate	99.1	100.1	100.3	100.4	101.1	101.6	101.5	100.3
Patternmakers	109.0 *(117.1)*	109.1 *(114.8)*	109.3 *(113.5)*	110.1 *(112.8)*	104.6 *(105.5)*	100.2 *(105.3)*	99.8 *(104.9)*	98.9 *(104.6)*
Platers, riveters, caulkers ...	99.2	97.4	99.5	98.3	102.4	101.4	100.0	99.2
Semi-skilled :								
Turners and machinemen rated below fitters' rate	84.3	84.5	84.4	85.1	93.7	93.5	93.0	92.3
Unskilled : ...								
Labourers	78.7 *(85.3)*	77.4 *(84.7)*	77.2 *(86.0)*	76.9 *(86.8)*	78.7 *(82.9)*	77.2 *(83.1)*	77.1 *(84.4)*	76.0 *(85.2)*

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[1] Not corrected for overtime premia (see note to Table VII).

[2] For pieceworkers, the Minimum Piecework Standards.

ries.[1] The position of pieceworking patternmakers also worsened: their differential over fitters fell by nearly 6 points between 1948 and 1953, their hourly earnings in the two latest years having actually sunk below fitters'. (Timeworking patternmakers on the other hand more than maintained their percentage differential over fitters, despite the fact that in 1950 their prescribed percentage bonus was replaced by a flat-rate addition.[2]) Pieceworking sheet metal workers in 1953 were once more the highest-paid category, although their differential over fitters has fallen by 6 points since 1948.

The course over time of the piecework differential based on average earnings has to be exemplified by those of fitters and labourers, as we have a complete series of figures from 1926 only for these two occupations. However, while no occupation can be called 'typical' in this respect (as we have seen, piecework differentials based on average earnings vary greatly from occupation to occupation), the piecework differentials based on the average earnings of fitters and labourers are fairly close to the weighted figure for all nine occupations together.[3] In Table IX, the piecework differentials based on the average hourly earnings (corrected for overtime)[4] of fitters and labourers are compared with those implied by national Agreements. Thus for fitters the implied differential narrowed from 27 per cent in 1926 to 8 per cent in 1953, while the corresponding earnings differential narrowed only from 25 to 13 per cent; for labourers, the prescribed differential narrowed from 25 to 6 per cent while the earnings differential narrowed from 28 to 12.

TABLE IX

Piecework Differentials

	Percentage by which pieceworkers' wage exceeded timeworkers'								
	1926	1928	1931	1938	1942	1948	1951	1952	1953
Fitters									
implied ...	27.4	23.0	16.4	14.4	11.7	10.0	9.1	8.3	7.9
actual[1] ...	24.5	22.2	16.0	18.2	31.2	13.2	13.0	12.2	12.7
Labourers									
implied ...	25.0	19.1	13.1	11.0	8.4	6.9	6.9	6.2	5.9
actual[1]	27.7	18.8	15.5	16.0	13.9	12.7	12.1	11.6	11.1

[1] Based on average hourly earnings corrected for overtime premia.

Pieceworkers' earnings naturally tend to 'run away' from timeworkers' as productivity increases, and it is not easy to control the relationship between the two by national agreement. One method, of course, is to increase all piecework prices by a smaller uniform percentage than that by which time rates are increased—as is done, for example, in shoemaking. But the method of making occasional uniform percentage changes in piecework prices is inapplicable in engineering, where technological development is rapid and uneven and where local adjustments are constantly having to be made to particular prices and times. Moreover, because of the wide variation between one pieceworker and another in the ratio of flat-rate payments to straight piece payments, any uniform percentages increase in piecework prices would at once create serious anomalies in earnings. The employers, complaining that in any case ' the adjustment of millions of piecework prices and times is a problem of infinite difficulty '[1], have favoured the simplest expedient of all —to give timeworkers and pieceworkers equal money increases. This practice ensures that pieceworkers receive smaller percentage increases than timeworkers. There has thus been considerable pressure to reduce the pieceworkers' differential, and this pressure has been intensified in practice by the extension of compensatory payments of various kinds to timeworkers. In spite of this the differential based on average hourly earnings has narrowed considerably less than has been implied by national Agreements[2].

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[1] Average hours worked fell in a few sections of the industry between 1952 and 1953, the fall for foundries (1 hour) being greater than for any other of the sections shown in Table XIV below. Partly in consequence, the average weekly earnings of moulders (both timeworkers and pieceworkers) declined slightly—in marked contrast to those of every other occupation.

[2] Thus the pieceworking patternmakers' differential over their timeworkers fell from 7 per cent to zero between 1948 and 1953, partly no doubt as an after-effect of the patternmakers' Agreement of November 1946 (see p. 282).

[3] The weighted average piecework differential for all nine occupations in June 1953 was 13 per cent, while the comparable figures (*i.e.* uncorrected for overtime) for fitters and labourers were 12 and 10 per cent respectively.

[4] This correction for overtime premia has been made because pieceworkers always work shorter hours, on average, than timeworkers.

(*b*) *Regional pattern of earnings*

As we have seen, district differentials in wage rates are by now very few and generally very small. They are no more than the fossils of an earlier era, which escaped obliteration by the 1948 agreement; but, as we showed in a previous article, the regional pattern of rates has for many years borne no relation to that of earnings.

Earnings in the Federation districts

The regional coverage of the Federation earnings data is unusually detailed. While a few of its 47[3] district associations are very extensive, many are confined to single towns. The number of workers covered varies considerably: while in June 1953 the average was over nine thousand, this figure was exceeded in only 11 districts and in 5 there were actually less than one thousand. Thus the districts, as such, are somewhat unsatisfactory units and usually need to be grouped for purposes of presentation; however, they give some indication of the spread of earnings.

The districts with the most workers tend to have the highest average earnings:[4] in particular, earnings in the Coventry district, which contains over 20,000 workers, averaged more than 43s. above those in any other.

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[1] Sir Alexander Ramsay (*Proceedings at Special Conference, etc.*, November 30th, 1949).

[2] In shoemaking, where there have been comparable pressures, the pieceworkers' differential based on average earnings has actually widened. For a fuller discussion of these points, see *Earnings in the Boot and Shoe Industry*, BULLETIN, February-March, 1954.

[3] There are actually only 46 associations, but for the purposes of the enquiries the London Association has been divided into the London area proper and the surrounding counties. For a complete list of the associations, see Appendix D.

[4] The unweighted mean of the 47 district figures of average weekly earnings in June 1953 was over 11s. lower than the corresponding weighted mean—*i.e.* the average for the country as a whole. (These averages cover all nine occupations.)

The maximum difference between earnings in any two districts was 120s., although in nearly nine-tenths of the districts the range was of no more than 40s. (between 175s. and 215s.). These differences cannot be adequately explained by differences in average hours worked; for while the maximum difference between any two districts was 5½ hours (in about three-quarters of them it was 3), there was little systematic relation between higher earnings and longer hours. Indeed, in Coventry fewer hours were worked than in the great majority of the others.

Nor can regional differences in average earnings be explained away by the presence of different proportions of particular categories of workers in various districts; for, even when timeworkers and pieceworkers are examined separately, the spread of the district averages of the earnings of workers within single occupations is usually at least as great as that of the district averages for workers in all nine occupations together. Of course, the occupational categories themselves are by no means homogeneous, if only because they cover workers in diverse sections of the industry; and, in so far as particular types of engineering predominate in particular districts, one would expect some variation in average earnings on this account. But some of the differences are much too large to be explained in this way. For instance, in May 1952 the maximum difference between districts in the average weekly earnings of timeworking sheet metal workers was no less than 157s., and of pieceworking patternmakers 255s.[1]. Again, timeworking labourers in more than half the districts were earning more than fitters in the district where the earnings of the latter were lowest; while in half-a-dozen districts fitters earned less than the highest figure reported for labourers. No less remarkable anomalies are found in other years.

When we come to consider how far the pattern of district earnings has altered over time, we are somewhat restricted as the only continuous series are for fitters and labourers and even these are complete for only 36 districts—which, however, include all the important ones—out of the 47. As might be expected there have been considerable changes in the ranking of the district averages. Only a few have consistently maintained their positions: but London, Birmingham and, above all, Coventry have been at or near the top for many years. In Diagram III we show the spread of the district averages of the hourly earnings of timeworking and pieceworking fitters. The distribution of these averages has always been fairly compact, although the overall range widened during the war (especially for pieceworkers) and again during the recent rearmament (when the widening was more marked for timeworkers). The position of the Coventry district is quite exceptional: to have included it with the others would in recent years have virtually doubled the overall range and thus have given a quite false impression. Even in the 'twenties, earnings in Coventry were about 20 per cent above the median for time-

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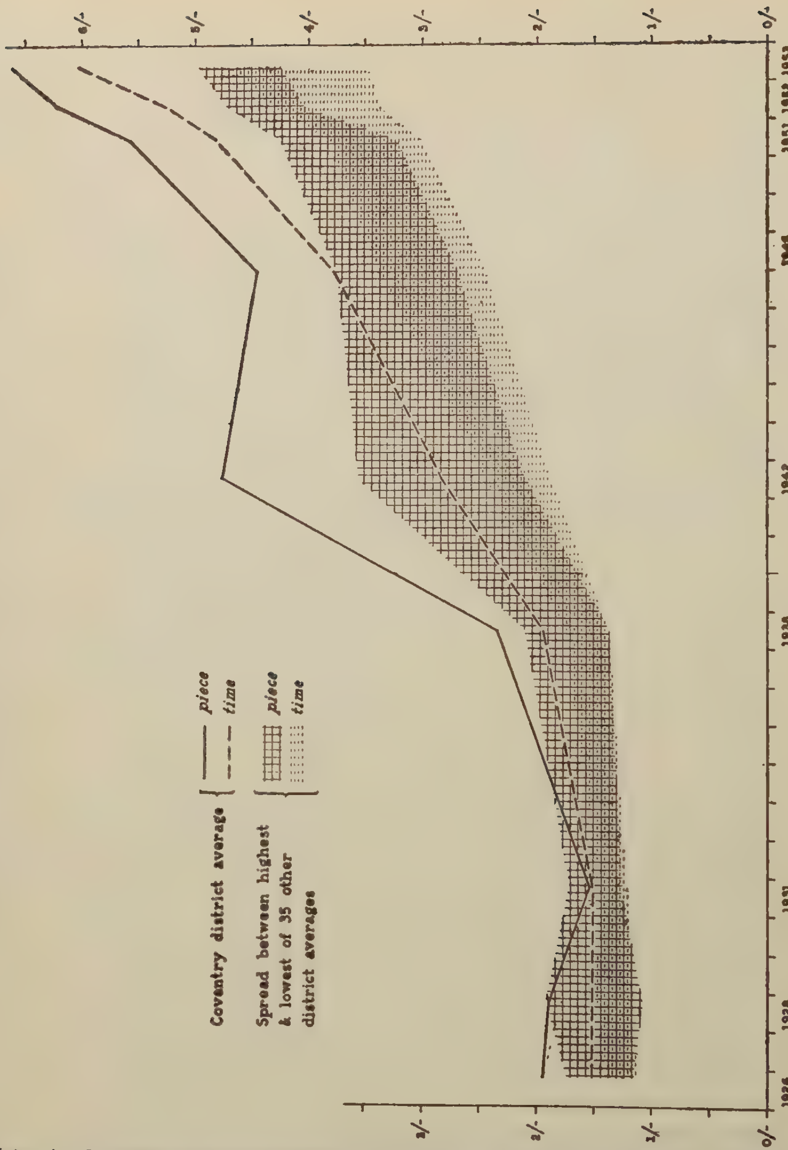
[1] Thus the difference between the highest and lowest district average was equivalent to more than 1½ times the pieceworking patternmakers' expected minimum earnings. In neither case was the difference due to differences in hours: indeed, the higher-paid patternmakers worked fewer hours than the lower-paid.

III. Spread of district averages of fitters' hourly earnings



Note. As the figures from successive enquiries have been joined by straight lines, the diagram should not be taken to show with any great accuracy the actual course of earnings *between* enquiries—especially in the period 1942–48.

workers and about 30 per cent above that for pieceworkers; and although the pieceworkers lost their lead in the slump they had fully regained it by 1938. Thereafter both categories greatly extended their advantage: by 1953, earnings in Coventry exceeded the medians by 40 per cent for timeworkers and by nearly 50 per cent for pieceworkers. Timeworkers' average earnings in Coventry have risen well above those of pieceworkers in any other district, reaching nearly 90 per cent above the consolidated rate. In effect, even if wages were to go on rising at the rate of the last few years, fitters' earnings in Coventry would still have a lead of three or four years over those in any other district[1].

It must be stressed that the figures plotted in Diagram III are district averages only. Obviously, no inferences can properly be drawn from such figures about the distribution of the earnings of individual workers or about changes in this distribution—points on which much speculative argument is expended in wage negotiations, when the unions counter the employers' figures of high average earnings with the assertion that these averages cover a considerable number of workers earning little more than their bare minima. The overall range of individuals' earnings must, of course, be far greater than that between the highest and lowest district averages. The lowest district averages for timeworkering fitters and labourers in 1953 were about 14s. and 6s. per 44 hour week above their respective minimum rates[2], although the Federation has stated that about 3 per cent of fitters and 13 per cent of labourers were on their bare minima[3].

Earnings by area

For ease of presentation and for the sake of continuity, we may now group the districts into the same 12 areas of roughly comparable size as were used in the previous article.[4] In Table X are shown average weekly and hourly earnings in each of these areas for 1953 together with the increases since 1948. Earnings are still highest in the Midlands and in London, and lowest in the North and in Scotland (a regional pattern not peculiar to the engineering industry). Proportionately, the differences are about the same in hourly as in weekly earnings. The regional differentials are of the same order of magnitude as those between the semi-skilled and the various skilled occupations.

[1] Remarkable earnings are general in Coventry and are not, of course, confined to fitters or to Federated firms. Semi-skilled workers in the (unfederated) Standard Motor Company's Coventry works were recently reported as earning £14 for a 42½-hour week, with an additional £3 10s. for overtime (*Manchester Guardian*, May 22nd, 1954). This level, said to be the highest in the industry, is about the same as the average for skilled pieceworking fitters in Federated firms in Coventry less than a year before.

[2] The two districts in question are extremely small, and contain only a fraction of 1 per cent of all the timeworkers in the two occupations.

[3] *Report of Court of Inquiry* (*Cmd.* 9084, February 1954), pp. 42–43. The Federation held its enquiry in 1950, but stated that the position 'should not materially have changed.' However, it does not necessarily follow that the same workers remain continuously on the minimum, as individuals' earnings may vary considerably from week to week irrespectively of overtime.

[4] For the precise definition of these areas, see Appendix D.

TABLE X

Average Earnings[1] *by Areas*

Area	*Weekly earnings*		*Hourly earnings*		*Regional differentials in 1953*	
	1953 level	increase since 1948	1953 level (s.)	increase since 1948 (s.)	weekly	hourly
West Midlands	223/9	69/6	4.83	1.35	108.8	112.5
London	210/1	62/11	4.38	1.21	102.1	102.1
East Midlands	207/4	68/7	4.27	1.25	100.8	99.5
Eastern	198/11	63/2	4.24	1.21	96.7	99.0
Western	203/10	69/3	4.23	1.24	99.1	98.6
Southern	201/10	64/5	4.17	1.13	98.1	97.3
North-East Coast	206/3	71/–	4.12	1.25	100.2	96.1
Lancs. and Cheshire	197/3	62/3	4.10	1.16	95.9	95.5
Scotland	200/7	69/1	4.04	1.21	97.5	94.2
North-West Coast	187/8	63/2	4.00	1.19	91.2	93.3
Yorkshire	183/6	54/11	3.91	1.07	89.2	91.1
Northern Ireland	203/9	78/1	4.17	1.37	99.0	97.3
United Kingdom	205/9	66/5	4.29	1.23	100.0	100.0

[1] For all 9 occupations.

The increase in earnings between January 1948 and June 1953 was greatest in Northern Ireland (78s.) and smallest in Yorkshire (55s.). If we exclude Northern Ireland, which is discussed separately below, the differences between the increases were insufficient to affect appreciably the regional earnings pattern of 1948—although the spread widened by 10s. 6d.[1] The maximum difference between any two average regional increases in earnings in Great Britain was 16s., or about a quarter of the average increase for the country as a whole.

Northern Ireland is a special case. It was subject, during the war, to an exceptional expansion of engineering (particularly of aircraft manufacture): the proportionate increase in employment in Federated firms between the enquiries of 1938 and 1942 was four times as high in Northern Ireland as it was in the United Kingdom as a whole; moreover, hours worked were exceptionally long. After the war, however, the aircraft section was virtually closed down, and the general decline in employment in Federated firms between 1942 and 1948 was twice as severe in Northern Ireland as elsewhere. Hours worked also showed a disproportionate fall. But rearmament has brought a revival: in Northern Ireland between 1948 and 1953, while employment in aircraft has increased by more than a half, in other types of engineering it has slightly declined.[2] This seems to have again touched off Irish earnings, and probably accounts for some of the exceptional advance shown in Table X. All these economic vicissitudes are reflected, to some extent, in Table XI, which is based on the average weekly earnings of workers in the three main grades of skill and shows how the Irish figures have oscillated about the general average.

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[1] It narrowed very slightly in percentage terms.

[2] In Northern Ireland, the number of males employed in aircraft rose from 4.8 to 7.4 thousands, while it declined from 23.6 to 22.8 in the other engineering trades—*i.e.* those in orders VI and VII of the Standard Industrial Classification excluding shipbuilding and garages. (*Ministry of Labour Gazette*, February 1953 and February 1954).

TABLE XI

Changes in Average Weekly Earnings[1]

	Northern Ireland (a)	*United Kingdom* (b)	*Difference* (a—b)
1938 July to 1942 July	+ 73/4	+ 53/2	+20/2
1942 July to 1948 January	— 22/11	+ 4/8	—27/7
1948 January to 1953 June	+ 74/4	+ 63/5	+10/11
1938 July to 1953 June	+124/9	+121/3	+ 3/6

[1] Of fitters, turners and machinemen rated below fitters' rate, and labourers (timeworkers and pieceworkers together).

Before we come to examine the main determinants of the regional patterns of weekly and hourly earnings, we must consider the possibility that differences from region to region in the proportions of workers in the different categories covered (skilled and unskilled, timeworkers and pieceworkers) may tend to warp these patterns.[1] But while skilled workers earn more than semi-skilled and unskilled, there is no systematic relation for the 12 areas between the proportion of skilled workers and the level of average earnings for the nine occupations (although there does tend to be a higher proportion of unskilled workers, and a lower proportion of semi-skilled, in the areas where average earnings are lowest). Again, there is no systematic relation between high regional earnings and high proportions of pieceworkers—indeed, it is in the area with the second lowest earnings that the proportion of pieceworkers is highest.[2] In fact, the differences in employment weights,[3] though often substantial in themselves, appear to have a very minor effect on our earnings averages, as can be seen from Table XII. Despite the big variations in the proportions of workers in the different categories in the three areas selected,[4] the reweighted earnings figures (based on standardised employment weights)[5] differ by only 1 per cent or less from actual earnings. However, the effect of reweighting on the differences in average earnings between areas is not so negligible, and on balance would probably slightly reduce the regional spread.

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[1] These differences are of course not unrelated to differences in the types of engineering found within particular areas—the effects of which are discussed in a later section.

[2] This results in the paradox of a slight negative correlation between levels of earnings and proportions of pieceworkers in the different regions. But this correlation disappears if the districts are differently grouped—which illustrates the difficulty of interpreting correlation coefficients based on essentially modifiable units such as geographical areas.

[3] *I.e.*, the differences between the proportions of workers in the various categories.

[4] London was chosen because its occupational structure is fairly typical of the industry as a whole ; Scotland and the Eastern Area, because theirs are the most abnormal.

[5] That is, the proportions of skilled, semi-skilled, and unskilled, and of timeworkers and pieceworkers, in the industry as a whole, were used as weights.

TABLE XII

Reweighted[1] *Levels of Regional Average Earnings (June 1953)*

Area	Weekly		Hourly (s.)	
	actual	reweighted	actual	reweighted
London	210/1	*209/2*	4.378	*4.359*
Eastern	198/11	*196/11*	4.244	*4.200*
Scotland	200/7	*200/10*	4.041	*4.046*

[1] *I.e.* weighted by the U.K. proportions of timeworkers and pieceworkers in each of the 9 occupations.

However, no satisfactory interpretation of regional differences in earnings can be attempted without first considering the corresponding differences between the various types (or ' sections ') of engineering.

(*c*) *Sectional pattern of earnings*

Engineering, while concerned chiefly with metal manufacture, is an industrial colossus : its products range from gasometers to jet engines, cathode ray tubes to combine harvesters, and telephones to tanks. For our purposes it comprises all firms which are bound by the national Agreements between the Engineering and Allied Employers' National Federation and the Confederation of Shipbuilding and Engineering Unions. Before 1914 there was some variation in the rates of workers in the same occupation between different sections of the industry[1]; but these sectional differentials, unlike district differentials, did not survive the impact of national negotiation. Thus, except in so far as district differentials themselves were—because of the concentration of particular sections of the industry in particular districts—in effect disguised sectional differentials, all traces of these sectional differentials in wage rates have long since disappeared.[2]

However, even though there are no sectional differentials left in rates, the economic fortunes of the various sections have been so different that, as one would expect, there is considerable divergence in their average earnings. The 29 sections distinguished by the Federation vary greatly in size, ranging from general light engineering with over 100,000 workers in the nine occupations to small specialised branches with one or two thousand, such as telephone manufacture. The maximum difference between average earnings in any two sections in 1953 was 63s., but over four-fifths of the sectional averages lay within the range 180s. to 210s.[3]

Average earnings in the twelve main sections—which cover 88 per cent of all workers, and include those with the highest and lowest levels of earnings —are shown separately for 1953 in Table XIII (the remaining 17 being

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[1] For example, in 1913 the rates of fitters in Birmingham were 2s. lower in general engineering than in ordnance (see *Time Rates of Wages* for 1913).

[2] An apparent exception is the differential of foundry labourers over engine shop labourers ; but this can equally well be regarded as an occupational differential.

[3] Thus the maximum difference between sectional averages is about half that between district averages (see p. 303), although the humps of the distributions of both cover the same class intervals. However, as the geographical and sectional groups to which the firms are allocated are to some extent arbitrary, the dispersions between such groups obviously depend upon their size and character.

TABLE XIII

Average Earnings[1] by Sections of Industry

Section	*Weekly earnings*		*Hourly earnings*		*Sectional differentials in 1953*	
	1953 level	increase since 1948	1953 level (s.)	increase since 1948 (s.)	weekly	hourly
Motor cars and cycles	228/5	71/7	4.96	1.35	111.0	115.6
Aircraft	237/4	87/5	4.78	1.42	115.4	111.4
Machine tools	219/–	78/9	4.48	1.36	106.5	104.4
Electrical engineering	206/2	64/10	4.24	1.18	100.2	98.8
Commercial vehicles	189/7	47/4	4.19	1.06	92.2	97.7
General engineering : heavy ...	203/10	68/8	4.18	1.26	99.1	97.4
Foundries	198/7	59/9	4.16	1.18	96.5	96.9
General engineering : light ...	195/8	60/4	4.13	1.15	95.1	96.2
Miscellaneous[2]	196/1	56/5	4.13	1.07	95.3	96.2
Constructional engineering ...	193/4	66/11	3.98	1.17	94.0	92.7
Marine engineering	202/5	70/3	3.96	1.16	98.4	92.3
Textile machinery	181/11	53/5	3.92	1.08	88.4	91.3
Agricultural machinery	174/5	45/7	3.76	0.91	84.8	87.6
All sections	205/9	66/5	4.29	1.23	100.0	100.0

[1] For all 9 occupations.

[2] This category comprises the remaining 17 sections as distinguished by the Federation, *i.e.*: allied trades; boilermakers; brassfounders; coppersmiths; drop forgers; gas meters; instruments; lamps; lifts; locomotives; plastics; scale, beam, etc.; sheet metal; tanks and gasholders; telephones; wagon builders; and miscellaneous.

amalgamated into ' miscellaneous '). In general, earnings were highest in those sections—such as aircraft, vehicles, machine tools, and electrical engineering—which have been expanding the most during the past twenty or thirty years; while in the older-established sections—such as marine engineering and textile machinery—which were faced with a secular decline in demand between the wars and were particularly hard-hit by the depression, earnings were still relatively low in 1953. They are lowest in agricultural machinery—perhaps because earnings in this section have even now not fully recovered from the effects of the chronic depression which overtook agriculture itself in the latter part of the nineteenth century.

Some of the differences in weekly earnings between sections are partly explained by differences in hours worked, which tended to be lower in the lower-paid sections; but with two exceptions (commercial vehicles and marine engineering)[1] the ranking of hourly earnings was not very different from that of weekly earnings. When we examine the changes between 1948 and 1953, we find that the increases in earnings varied considerably from section to section, particularly after 1950 when earnings were rising most rapidly. In general—and this was also true to some extent of areas—earnings have tended to increase most where they were already highest in 1948 : as a result, the overall range of sectional weekly earnings widened by 33s. The increases in earnings have largely reflected the different changes in demand (as indicated by production and employment) which have confronted the individual sections over the period—particularly between 1951 and 1953.

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[1] In commercial vehicles (as well as in motor cars and cycles) hours were comparatively short; whereas in marine engineering they were very long.

The greatest expansion has occurred in the aircraft industry, where between May 1951 and May 1953 the employment of male workers increased by no less than 47,000, or 33 per cent.[1] Other sections which benefited substantially from rearmament were machine tools and part of the electrical industry: indeed, in 1952 it was necessary to step up imports of machine tools from the United States and Europe to help equip armaments factories,[2] and employment in this section rose between 1951 and 1953 by over 12,000, or 17 per cent. At the other extreme, we find that during the same two years employment in textile machinery fell by 8,000, or over 11 per cent—largely between 1952 and 1953, and doubtless as a result of the previous recession in textiles. Other sections in which employment declined were agricultural machinery and foundries—again largely between 1952 and 1953.

The changes in hourly earnings during this period are closely associated with these employment changes. Thus the largest increase in earnings between the Federation enquiries of June 1951 and June 1953 is found in aircraft, and the second largest in machine tools. The smallest occurred in agricultural machinery, followed by textile machinery and foundries. In general, the strength of the association between changes in average earnings and proportionate changes in employment[3] is shown by a correlation coefficient of +0.8.[4] This suggests not only that firms were pushing up wages in order to attract labour but that labour was actually responding to the pull —an interpretation which, if correct, is an unusually clear illustration of the working of orthodox wage-theory. Moreover, it would seem probable on general grounds that rising output per man-hour contributed to some of the larger increases in earnings; and this too is perhaps reflected in a higher correlation coefficient being obtained for pieceworkers (+0.8) than for timeworkers (+0.7) between these changes in employment and in hourly earnings. Pieceworkers' earnings are obviously the more sensitive to changes in output per man-hour, and this is likely to increase more in those sections which are expanding than in those where employment is static or falling.

We have already noted that the connection between productivity and earnings seems to have been strongest in vehicles—partly no doubt because of the high proportion of pieceworkers. In this section, employment has remained fairly static for some time; but production, and hence output per man,[1] has fluctuated strongly. In commercial vehicles production has declined ever since 1950, whereas in motor cars the decline was comparatively short-lived. Motor-car production reached a peak in the export boom of 1950, fell off in 1951–52 when the export market collapsed and steel supplies were short, and rose very steeply in 1952–53[2] when the steel shortage had eased. Pieceworkers' average hourly earnings in motor cars were responsive to this fluctuation : they increased much more than the average between 1948 and 1951 (despite the *pro tanto* Agreement); in 1951–52 their rise was below average; while in 1952–53 it was again easily the largest for any section. Thus in vehicles the dominant influence on the rate of increase of earnings during this period seems to have been productivity (in the above sense) and not employment.[3]

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[1] United Kingdom figures from *Ministry of Labour Gazette*. Federation figures should, strictly, not be used here, as changes in these might be partly due to changes in Federation membership.

[2] See *Economic Survey for* 1953 (*Cmd.* 8800), p. 34.

[3] The correlations which follow relate to ten sections. In order to secure comparability between Ministry of Labour and Federation figures, 'miscellaneous' has been omitted from the thirteen sections shown in Table XIV; 'general engineering, heavy' and 'general engineering, light' have been combined and taken as equivalent to 'other non-electrical engineering'; and 'motor cars and cycles' and 'commercial vehicles' have also been combined as official publications do not show them separately.

[4] Exactly the same result is, in fact, obtained even if Federation employment figures are used.

Differences in sectional average earnings tend to be reduced—though not very substantially—when allowance is made for differences in employment structure, as those sections (particularly aircraft) where earnings are highest have, on the whole, the biggest proportions of skilled workers and of pieceworkers. (In one section—foundries—an exceptionally high proportion of labourers (36 per cent in 1953) depresses average earnings less than might be expected since, as we have seen, foundry labourers are better paid than other labourers.[4]) In Table XIV the earnings figures for certain sections have been reweighted in exactly the same way as were those for regions in Table XII. The effect on motor cars and cycles is completely negligible, as a relatively high proportion of pieceworkers is offset by a low proportion of skilled workers; but in aircraft there is no such counterbalance and the effect of

TABLE XIV

Reweighted[1] Levels of Sectional Average Earnings (June 1953)

Section	*Weekly* actual	*Weekly* reweighted	*Hourly* (*s.*) actual	*Hourly* (*s.*) reweighted
Aircraft	237/4	*227/7*	4.776	*4.579*
Motors cars and cycles ...	228/5	*228/2*	4.959	*4.954*
Marine engineering ...	202/5	*204/–*	3.957	*3.987*
Constructional engineering	193/4	*197/2*	3.976	*4.054*

[1] *I.e.*, weighted as before by the proportions of timeworkers and pieceworkers in each of the 9 occupations in the industry as a whole.

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[1] And, for that matter, output per man-hour: for the fluctuations in hours worked in this section were not nearly sufficient to offset the fluctuations in production.

[2] The number of motor cars produced in 1953 was 32 per cent higher than in 1952, and reached a new record—home supplies increasing by 57 per cent (*Economic Survey for* 1954, *Cmd.* 9108, pp. 49–51).

[3] Because, in vehicles, output per man-hour and employment were clearly not associated, this section was the most important exception to the general association between changes in employment and in earnings : if vehicles are omitted, the correlation rises from +0.8 to over +0.9. (However, these coefficients, as they are calculated from averages based on grouped data, may well exaggerate the strength of the associations noted.)

[4] The differential in rates was 2s. 9¾d. in 1953 (see Diagram I above) ; and the corresponding differential in timeworkers' earnings for a 44-hour week in June of that year was 5s. 6d.

reweighting is to reduce hourly earnings by 2¼d. and weekly earnings by about 10s. On the other hand, in two of the lowest-paid sections—marine and constructional engineering—weekly earnings are increased by about 1s. 6d. and 4s. respectively. In general the differences in earnings between sections other than aircraft are very little affected by reweighting, although those between aircraft and most of the rest are appreciably reduced.

(*d*) *Interrelation of regional and sectional patterns*

The overall regional and sectional patterns of average earnings just examined may tell us little about the possible effects of location and type of engineering; but as the Federation has made available to us two-way breakdowns of earnings by regions and sections simultaneously, we can make some attempt to isolate these effects. If however we are to do this at all thoroughly, we need figures which are not only reasonably representative but which are also reasonably homogeneous—so as to eliminate as far as possible the effects on earnings of extraneous factors such as differing proportions of skilled workers or pieceworkers and differences in hours worked. We are therefore confining ourselves to an analysis of the standard-week earnings of time-working and pieceworking fitters[1] separately, in each of the 12 regions and the 12 sections[2] shown in previous tables.

It was immediately apparent from the two-way breakdowns that there was considerable variation from section to section in the regional pattern of earnings, and to a lesser extent from region to region in the sectional pattern. Thus, for timeworkers, earnings tended to be high in most sections in London, and even higher in the West Midlands; while in Scotland and in Yorkshire they were fairly consistently below average. Earnings in aircraft (and, generally, in machine tools) were relatively high in all regions, whereas in agricultural machinery they were invariably well below average. For the rest, it is much more difficult to generalise. Even motor cars and cycles, while they were exceptionally highly-paid in the West Midlands and (to some extent) in London, were relatively very low-paid in the East Midands and in Yorkshire. On the other hand general heavy engineering was low-paid in the West Midlands and highly-paid in some of the low-earnings regions.

For pieceworkers, although the general pattern was not dissimilar to that for timeworkers, the apparent anomalies were perhaps even more striking. The earnings lead of the West Midlands in motors and cycles, in machine tools, and most of all in aircraft, was quite extraordinary. It seems clear that Coventry (where, as we have already seen, earnings are exceptionally high) was largely responsible, as these are its main industries. Again, earnings in aircraft were high fairly consistently, while in motors and cycles they were high only in the West Midlands; in Yorkshire they were relatively very low for both these sections. Two marked peculiarities were the high earnings for electrical engineering on the North-East Coast and for general light engineering in Northern Ireland. Some of these apparent anomalies are probably due to the heterogeneity of the sections considered, but this is not necessarily the complete explanation.

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[1] While no single occupation which is large enough to be considered representative can also be really homogeneous, fitters are clearly the most suitable in these respects and have long been treated as such by the Federation.

[2] *I.e.*, all sections except ' miscellaneous '.

Naturally, not all sections of the industry are found in every region of the country, and the geographical distribution of some of the specialised types of engineering bears little resemblance to that of the industry considered as a whole. We must therefore consider the effects of this very uneven geographical distribution on the average earnings for the regions and the sections. The differences between the regional averages partly reflect differences in industrial structure—*i.e.* in the extent to which high- or low-paid sections of the industry are relatively concentrated in particular areas.[1] Conversely, the differences between the sectional averages are affected by the extent to which the sections are relatively concentrated in high- or low-earnings regions. These weighting effects make the differences between the regional and sectional averages more difficult to interpret: to what extent are earnings higher on average in the West Midlands than elsewhere because of the concentration of the motor industry there, and to what extent are they higher in motors because this section is concentrated in the West Midlands?[2] We must provide some solution to these weighting problems before we can see even the average effect on earnings of location and type of engineering.

Table XV shows, for timeworking fitters, the differences of the average standard-week earnings in particular regions (in Column 1) and in particular sections (in Column 4) from the national average of 181s. 7d.[3] Each set of differences has been split into two components, by a technique involving a series of corrections to the original data based on the regional and sectional patterns of employment.[4] The first component (Columns 2 and 5) is an attempt to measure the effect of concentration; the second gives some indication of the intrinsic effect on earnings of working either in a particular region (Column 3) or in a particular section (Column 6). The result of eliminating the concentration component is appreciably to reduce the original dispersion of the regional figures, and to a much lesser extent of the sectional —the range for regions falling from 31s. 8d. to 22s., and for sections from 56s. 9d. to 48s. The regions where sectional concentration has the greatest effect are the West Midlands, where it raises average earnings by 5s. 2d., and the North-East Coast and Scotland, where it reduces them by 6s. 9d. and 6s. 3d. respectively. In the West Midlands this effect is predominantly due to the relative concentration of the high-paid motors section, and in the

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[1] A section is said to be ' relatively concentrated ' in a particular region if within that region the proportion of workers in the section concerned is larger than the share of the section as a whole in the industry as a whole.

[2] In the Federation data this concentration appears more pronounced than it is in reality, as although not all motor firms in the West Midlands are federated there are one or two very large unfederated firms—notably, Ford—outside this region.

[3] This figure (and the corresponding figure given later for pieceworkers) differs slightly from that given in Table IV, because of the omission here of the ' miscellaneous ' section.

[4] The method employed, with its underlying assumptions, is fully discussed in Appendix E.

TABLE XV

Effect of ' Relative Concentration ' on Earnings in June 1953 : Timeworking Fitters

Region	Average earnings for standard week (all[1] sections)			Section	Average earnings for standard week (all regions)		
	Total difference of original figure from national average (1)	— of which :			Total difference of original figure from national average (4)	— of which :	
		concentration component (2)	' true ' regional component (3)			concentration component (5)	' true ' sectional component (6)
West Midlands	+18/–	+5/2	+12/10	Motor cars and cycles ...	+29/5	+9/8	+19/9
London	+ 7/8	+3/1	+ 4/7	Aircraft	+23/11	+ /8	+23/3
East Midlands	— 5/4	—1/1	— 4/3	Machine tools	+ /5	—2/4	+ 2/9
Eastern	+ 1/3	—1/3	+ 2/6	Electrical engineering ...	— 6/2	+1/5	— 7/7
Western	+ 2/1	+4/5	— 2/4	Commercial vehicles ...	— 5/4	+3/11	— 9/3
Southern	— 7/2	+1/7	— 8/9	General engineering : heavy	— /3	—2/7	+ 2/4
North-East Coast	—13/7	—6/9	— 6/10	Foundries	— 9/1	— /8	— 8/5
Lancs. and Cheshire ...	— 1/9	—2/–	+ /3	General engineering : light...	— 7/7	— /11	— 6/8
Scotland	—14/9	—6/3	— 8/6	Constructional engineering	—16/9	+1/9	—18/6
North-West Coast	— 8/2	—1/10	— 6/4	Marine engineering ...	—17/5	—7/8	— 9/9
Yorkshire	—13/7	—4/4	— 9/3	Textile machinery	—10/10	—3/2	— 7/8
Northern Ireland	— 1/–	+4/11	— 5/11	Agricultural machinery ...	—27/5	+ /10	—28/3

[1] *I.e.*, except ' miscellaneous '.

other two regions to that of the comparatively low-paid marine engineering section. Conversely, we find that average earnings in the two sections in question are the most affected by concentration—which raises the average for motors by 9s. 8d. and depresses that for marine engineering by 7s. 8d. It appears therefore that average earnings in motors gain more from the concentration of this section in the West Midlands than do average earnings in the West Midlands from motors.[1] Some sections, on the other hand, aircraft and agricultural machinery, for example, are so distributed between high- and low-earnings areas that the effects of location are, on average, neutralised; so that the concentration component for these sections is very small.

Table XVI, which relates to pieceworking fitters, is identically constructed, and shows the differences of the regional and sectional figures from the appropriate national average of 204s. 4d. Here again the effect of eliminating the concentration component in average earnings is considerably to reduce the spread of the original regional and sectional figures—from 67s. 9d. to 55s., and from 63s. 10d. to 30s. 4d. respectively. The effect of relative concentration on the regional averages is more marked than it was for timeworkers, accounting for over 6s. in no fewer than five regions. Earnings in the West Midlands are again raised, once more because of the concentration of the motors section there; and on the North-East Coast and in Scotland average earnings are once again depressed by the concentration of marine engineering. In the Western and Southern Areas the effect of concentration is to raise earnings by almost as much as in the West Midlands—but in these two areas it is aircraft which is chiefly responsible. In Northern Ireland, on the other hand, the effect of aircraft is offset by marine engineering and textile machinery. When we turn to examine the effect of concentration on the sectional averages of earnings, we find once again that average earnings in motors appear to be much more boosted by the concentration of this section in the West Midlands than are average earnings in the West Midlands by motors.[2] The high average earnings in machine tools are also partly attributable to the concentration of this section in the West Midlands. Once the effect of concentration is eliminated, the most impressive feature of the regional figures (Column 3) is the very high differential (41s. 1d.) which persists in the West Midlands. Even more surprising, however, is the result that average earnings on the North-East Coast and in Northern Ireland turn

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[1] Whereas about four-fifths of the timeworking fitters in motors are found in the West Midlands, little more than a third of those in the West Midlands are employed in the motors section. As a result, average earnings in motors appear to be more dependent on the concentration of this section in the West Midlands than *vice versa*. Strictly, however, one cannot ascribe the concentration component for a particular region (or section) solely to the influence of a particular section (or region) ; for, on our definition, the concentration of a section in a region implies absence of concentration in at least one other section there. Thus in the present instance the relatively strong concentration component for the West Midlands could as well be ascribed mainly to the absence of marine engineering as to the concentration in motors. In effect, all concentration components are interdependent and are functions of the total patterns of employment and earnings.

[2] This is subject to the qualifications made in the footnote above.

TABLE XVI

Effect of ' Relative Concentration ' on Earnings in June 1953 : Pieceworking Fitters

Region	*Average earnings for standard week (all[1] sections)*			Section	*Average earnings for standard week (all regions)*		
	Total difference of original figure from national average (1)	— of which : *concen-tration component* (2)	*' true ' regional component* (3)		Total difference of original figure from national average (4)	— of which : *concen-tration component* (5)	*' true ' sectional component* (6)
West Midlands	+48/2	+7/2	+41/-	Motor cars and cycles	+44/11	+30/5	+14/6
London	+ 1/2	+3/4	— 2/2	Aircraft	+12/–	— 1/7	+13/7
East Midlands	— 4/6	—1/9	— 2/9	Machine tools	+ 6/1	+11/7	— 5/6
Eastern	— 9/2	—3/9	— 5/5	Electrical engineering	— 6/–	— 2/4	— 3/8
Western	— 4/4	+6/8	—11/–	Commercial vehicles	— 9/8	— 3/6	— 6/2
Southern	— 6/2	+6/4	—12/6	General engineering : heavy	— 9/4	— 5/2	— 4/2
North-East Coast	— 6/6	—9/–	+ 2/6	Foundries	—11/–	+ 1/11	—12/11
Lancs. and Cheshire	—11/6	—1/7	— 9/11	General engineering : light	—12/5	— 3/8	— 8/9
Scotland	—17/3	—6/7	—10/8	Constructional engineering	—16/4	— /6	—15/10
North-West Coast	—14/7	—4/10	— 9/9	Marine engineering	—18/9	— 4/3	—14/6
Yorkshire	—19/4	—5/2	—14/2	Textile machinery	—11/2	— 6/1	— 5/1
Northern Ireland	+ /4	—2/1	+ 2/5	Agricultural machinery	—17/6	— 4/2	—13/4

[1] *I.e.*, except ' miscellaneous '.

out to be higher than in any other region save the West Midlands itself.[1] As with timeworkers, the high average earnings in aircraft are in no way attributable to relative concentration; and, when the effect of the latter is eliminated (as in Column 6), the lead of vehicles in average earnings virtually disappears.

What do such results amount to? Two points must be stressed: first, that (as will be seen from Appendix E) the method employed necessarily involves assumptions which may not be wholly realistic; and second, that the 'components' given in Tables XV and XVI indicate what are, at best, no more than average effects. We have, in effect, tackled the most tractable of our difficulties, namely those arising from the very uneven geographical distribution of the different types of engineering; but there are clearly several other problems of at least equal importance. For example, what we have called 'relative concentration' is not the only way in which regional differences in earnings can be largely determined by one or two sections (and *vice versa*). For not only is the motors section heavily concentrated in the West Midlands, but—as we have seen—the difference between earnings in the West Midlands and elsewhere is much more marked in motors and (for pieceworkers) in aircraft than in other sections. The importance of this is illustrated by Diagram IV, which shows the effect on certain regional differentials of eliminating these highly-paid sections[2] from the figures. The result is, in general, to reduce the regional dispersion of earnings considerably[3]; although timeworkers' earnings in Northern Ireland—a low-earnings region—fall drastically in relation to the national average. In the same way, we could reduce the dispersion of sectional differentials—though to a lesser extent—if we were to eliminate certain regions. The compression of differentials is not the only effect of such exclusions, for the regional and sectional patterns themselves are naturally changed to some extent in consequence.

Although, as we have seen, the general picture for pieceworkers is broadly similar to that for timeworkers, it differs markedly in certain cases: for example, the North-East Coast, which is a low-earnings region for timeworkers, is a high-earnings region for pieceworkers. There are grounds for believing that many firms pay their fitters predominantly *either* by time *or* by the piece, and that relatively few use both systems of payment: so that in effect when we compare timeworkers with pieceworkers we are often making comparisons between different firms. Theoretically, of course, the fact that timeworking and pieceworking fitters tend to be found in different firms should be irrelevant, and there should be little discrepancy between their earnings patterns: so that the existence of some considerable discrepancies

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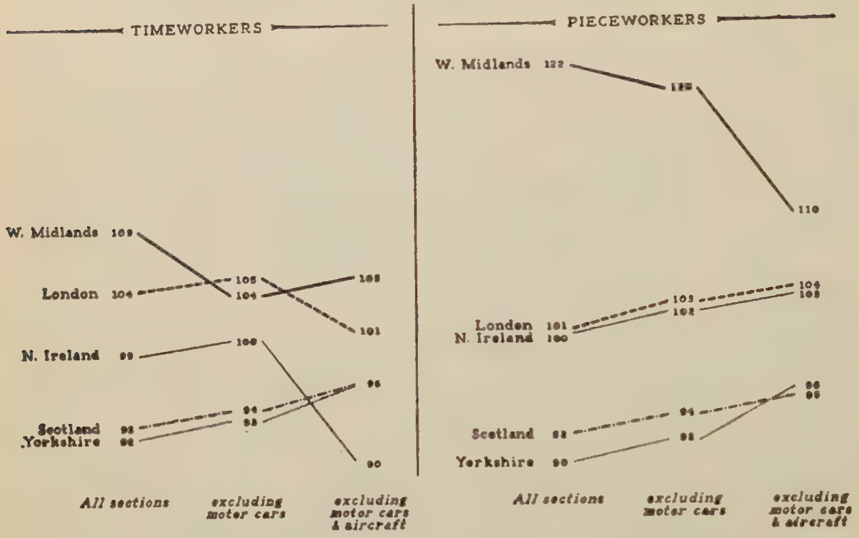
[1] On the North-East Coast, this appears to be due to unusually high earnings in electrical engineering there; and in Northern Ireland, partly to the unusually high earnings in general light engineering.

[2] Earnings in the machine tools section are also much higher in the West Midlands than elsewhere; but since this section is relatively small the effect of eliminating it from the figures would be slight.

[3] This can be seen from the diagram, as the highest and lowest regional figures are in fact included at each stage.

IV. Influence of motors and aircraft on certain regional differentials

(Fitters' hourly earnings in 5 regions as % of national averages)



emphasises the intrinsic heterogeneity of the regions and sections into which our engineering firms are grouped—a stubborn fact which had perforce implicitly to be neglected in the theoretical model on which our calculations are based. Coventry and Leek, Bristol and Penzance, Bournemouth and Chatham, are ill-assorted pairs of towns; yet for the purpose of analysis it has to be assumed that the effect of location on earnings is the same for each of these pairs—whereas for Coventry and Rugby, for instance, the effect is assumed to be different. However, in any analysis based on a geographical classification such ' frontier incidents ' are bound to occur. The same sort of considerations hold, of course, for any classification by type of engineering: for example, firms making motor cars and cycles are treated as if they were manufacturing identical products. Thus an apparent regional differential within a particular section is often no more than a concealed sectional differential. Again, genuine regional differentials may arise from what are essentially sectional influences: a firm belonging to a high-earnings section may, especially in times of labour scarcity, act as a local wage leader and compel all firms in the neighbourhood to pay high wages—with the result that a perceptible regional differential may eventually arise. But although some regional differentials may in fact have originated in this way, it would be wrong to conclude that ultimately there are no intrinsically regional influences on earnings at all. Much of our argument relating to the influence of sectional factors on the regional pattern of earnings is, in principle at least, reversible.

In this article, we may have paid rather more attention to sectional influences than to regional. However, a number of economic explanations (such as variations in productivity and proportion of labour cost, size of firm, and demand for products) can be advanced in the case of sectional differences, whereas the only ways in which location is likely to affect earnings are through the variability of the local supply of labour and of the local cost of living. Although in the nature of things we can never be certain whether the relative level of earnings in a particular instance is chiefly influenced by location or by type of engineering, and although no quantitative analysis of aggregate data could claim to resolve such a problem finally, we have given a provisional answer on the available evidence.

K. G. J. C. Knowles.
T. P. Hill.

APPENDIX A

Coverage of Federation data and comparison with Ministry of Labour figures

The principal industries of the Standard Industrial Classification (apart from those specifically designated as engineering) in which the Federation has member-firms are electrical machinery, motor vehicles, and aircraft. The full list is as follows:

Order V—
Iron foundries

Order VI—
Marine engineering
Agricultural machinery (exc. tractors)
Boilers and boilerhouse plant
Machine tools and engineers' small tools
Stationary engines
Textile machinery and accessories
Ordnance and small arms
Constructional engineering
Other non-electrical engineering
Electrical machinery
Telegraph and telephone apparatus
Wireless apparatus and gramophones
Wireless valves and electric lamps
Batteries and accumulators
Other electrical goods

Order VII—
Manufacture of motor vehicles and cycles
Manufacture and repair of aircraft
Manufacture of parts and accessories for motor vehicles and aircraft
Other locomotive manufacture
Manufacture and repair of railway carriages and wagons and trams

Order VIII—
Iron and steel forgings
Wire and wire manufactures
Metal industries not elsewhere specified

Order IX—
Scientific, surgical, photographic instruments
Watches and clocks

In this article, ' the engineering industry ' includes all the above. Total employment in the industry so defined is now well over 2¾ million (about one-seventh of the country's working population). Federation membership has more than doubled since before the war, and now comprises some 4,260 firms, employing over 1½ million people—about two-thirds of whom are adult male manual workers.

The Federation has conducted a number of enquiries into the earnings and hours—in each case for a single specimen week—of certain classes of manual workers in its member-firms. These enquiries, held primarily in connection with wage negotiations, have occurred at irregular intervals since 1926. In the latest enquiry of which use is made in the present article (that of June 1953), returns were completed by firms comprising over 90 per cent of the Federation's employing power, the number of adult male manual workers[1] covered being no less than 436,000. This figure, while larger than the total of men employed in some other major industries such as textiles and chemicals, represents only about half the men employed in the firms in question, as the enquiries cover selected occupations only and exclude all those on maintenance or repair work.

Of the selected occupations, 7 are skilled, 1 semi-skilled, and 1 unskilled —the skilled being appreciably over-represented and the semi-skilled under-represented (Table A 1); so that the average earnings for the male manual workers covered by the enquiries are probably rather higher than for all employed in Federated firms. A better estimate of the latter is therefore obtained by reweighting the average earnings for each grade of skill as given in the enquiries by the actual proportions of workers in these categories.[2] The effect of such a correction on the 1953 figures is to reduce the average weekly earnings of all workers from 205s. 9d. to 202s. 11d. (*i.e.*, by about 1½ per cent), and hourly earnings from 4.29s. to 4.26s. (an even smaller proportion). Thus the overweighting of the skilled at the expense of the semi-skilled affects the overall average very little.

TABLE A1

Percentages of Workers in Different Grades of Skill

	Skilled	*Semi-skilled*	*Unskilled*
All workers employed in Federated firms	47	35	18
Workers covered by Federation enquiry only (June 1953)	61	18	21

It is of some importance to compare the Federation's figures of earnings and hours with those of the Ministry of Labour's bi-annual enquiries (as used in Diagram II above). There are obvious differences in coverage : the Ministry sample is nearly three times as large as the Federation's; it includes workers in many more occupations; and it embraces non-Federated as well as Federated firms. In order to make the two sets of data as comparable as possible, we propose to set reweighted Federation figures against Ministry figures averaged over all the twenty-six sections listed above. The correspondence between the two (Table A 2) is remarkably good: indeed, the figures derived from the last three Federation enquiries are almost the same as would have been obtained by interpolation between Ministry of Labour enquiries—particularly in the case of hourly earnings. Even for 1948 the correspondence is quite good when allowance is made for the difference in hours worked, and for the 5s. increase which was awarded by national agreement between the two enquiries. While the close agreement between the two sets of figures may, in view of the differences in coverage, be partly fortuitous, it would seem to cast some doubt on the contention (maintained by the unions both during negotiations and before a Court of Inquiry)[1] that neither the Federation nor the Ministry figures can be relied on to measure changes in earnings over a period of years with any accuracy as they relate ' only to one week in each year cited '. Of course, the earnings of a single individual, and for that matter the average earnings of all workers in a single firm, may fluctuate considerably from week to week; but in engineering as a whole there is little evidence of fluctuation, even of regular seasonal fluctuation. Indeed, when allowance is made for the national increases, the upward progression every six months of the Ministry of Labour series for the industry as a whole could scarcely have been steadier.

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[1] Details for women and for juveniles were collected separately.

[2] However, as the workers covered by the enquiries are themselves not a random sample from each skill category, it is possible that some bias remains even after reweighting.

TABLE A2

Comparison of Federation with Ministry Figures
(Federation data italicised)

		Average weekly earnings	*Average hours*	*Average hourly earnings* (s.)
1948	*January* ...	*138/4*	*45.3*	*3.06*
	October ...	149/4	46.2	3.23
1951	April	171/–	47.6	3.59
	June ...	*172/6*	*47.6*	*3.63*
	October ...	175/10	47.9	3.67
1952	April	189/9	47.6	3.99
	May	*191/4*	*47.7*	*4.01*
	October ...	193/3	47.9	4.04
1953	April	202/5	47.8	4.24
	June ...	*202/11*	*47.7*	*4.26*
	October ...	206/4	48.0	4.30

The correspondence between Federation and Ministry figures is much less good for some of the individual sections than it is for the whole industry. This however is natural enough, as not only may the ratio of Federated to non-Federated firms vary considerably from section but there may also be serious differences in definition between the two classifications.

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[1] See *Report of Court of Inquiry* (*Cmd.* 9084), February 1954, pp. 20–21.

APPENDIX B

Average overtime earnings and supplementary payments

In recent engineering negotiations, the unions have laid considerable stress on overtime earnings. They argue that it is unjustifiable, when considering the merits of a wage claim, to set increases in average weekly earnings, in so far as these include overtime payments, against increases in the cost of living—the more especially as, they contend, relatively few workers have been making high earnings by working very long hours while the majority have not been working overtime at all. Our data throw no light on this question, although the Federation has stated that in June 1953 89 per cent of time-working fitters were employed in shops where average hours exceeded 44. However, some colour was given to the unions' contention by the figures published in the *Ministry of Labour Gazette* for July 1953 (and relating to the end of May). According to the Ministry, only one-third of the workers employed in the engineering, electrical, and vehicles industries (Orders VI and VII of the Standard Industrial Classification) were working any overtime, and these were doing an average of no less than 8 hours. Admittedly, these figures related to all workers and not merely to men; and thus, as overtime working is likely to be less prevalent among women and juveniles, the proportion of men on overtime was probably rather higher. Nevertheless, the incidence of overtime must have been fairly uneven—a point of some importance when we consider average overtime earnings.

As we have noted, overtime in engineering (as in most other industries) is paid on a daily basis : that is, all hours worked outside the normal working day are paid for at enhanced rates—*i.e.* at ordinary rates plus the appropriate overtime premium. Moreover, work is organised in such a way that a worker will not normally[1] be paid at enhanced rates for overtime unless he has also completed a day's work at ordinary rates.[2] But although for a given day his overtime earnings at enhanced rates could in most cases be defined as the difference between his total earnings for the day and his earnings at ordinary rates for the normal 8 hours, this is not necessarily true for a given week : for if he were to work short time on certain days and overtime on others, a subtraction from his total weekly earnings of 44 × his ordinary hourly rate would result in some underestimate of his overtime earnings. True, a combination of short time with overtime in a single week may not be a very common occurrence for an individual, but with large numbers of workers it may often be that some groups are working overtime and others short time. How far this happens cannot, of course, be deduced from figures of average hours worked; but where it does our estimate of average overtime earnings will inevitably be understated.[1]

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[1] Unless, for example, he happens to be late for work on a day when he also works overtime.

[2] This does not hold for certain industries—notably the docks—where work may be called for at inconvenient times (*i.e.* outside the limits of the normal working day) and thus attract enhanced rates even though a full 8 hours has not been worked (see *Dockworkers' Earnings*, BULLETIN, Sept.–Oct., 1952, pp. 362–3).

By ' average overtime earnings ' we mean the amount by which average weekly earnings would have been reduced if average hours worked had been no more than 44. To estimate this, we make some allowance for the payment of enhanced rates on the excess of average hours worked over 44. The premium by which rates are enhanced is simply a specified fraction of the consolidated time rate, although the fraction varies according to the length and timing of the extra work. It is impossible to guess the average premium, but it seems probable that at most times the majority of overtime hours, despite their uneven incidence, are paid at the lowest rate. Our calculations assume that they are all so paid, and thus again tend to understate overtime earnings. The method can be set out as follows :—

If W = average weekly earnings,
H = average hours worked, and
p = one-third of the consolidated time rate, then
average overtime premium $= p\,(H - 44)$
average standard-week earnings $(S) = \left\{ W - p\,(H - 44) \right\} \frac{44}{H}$, and
average overtime earnings $= W - S$.

Of course, in the earlier years slight adjustments have to be made because of different overtime rates (Table B 1) and the 47-hour week.

TABLE B1

Principal Overtime Rates

	First 2 hours	*After first 2 hours*	*Sundays and public holidays*
1920–31	Time and half	Time and half	Double time
1931–46	Time and quarter	,,	,,
1946–	Time and third	,,	,,

It will be seen that the estimates of average overtime earnings used in this article are minimal, both in conception and in method of calculation. However, to attempt to improve on them would involve pure guesswork about the extent of short-time working or about the average premium.[2] In practice it makes relatively little difference what precise assumptions are made about the premia—provided, at least, that we may assume the proportion of ' double time ' to be fairly small; and it seems best to select assumptions where the direction of the error is known.

Our estimates of average supplementary payments for a standard week (as defined in the text) will tend, conversely, to be maximal, as they are arrived at by deducting average overtime earnings and the consolidated rate—or Minimum Piecework Standard as the case may be—from average weekly earnings. It follows that one component, although a small one, of our supplementary payments is that part of the overtime premia which has not been allowed for in our estimate of average overtime earnings. Other undesirable ingredients are average shift premia and average district differentials in rates, which however we believe are also more or less negligible in this context. At any rate, *changes* in supplementary payments cannot be materially affected by the intrusion of these elements, which enter systematically into all our estimates.

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[1] Although we have no suitable evidence before 1952, the Ministry of Labour figures of short time and overtime indicate that, in 1952 and 1953 at least, our understatement on this account has been negligible.

[2] Moreover, we know little of the vagaries of particular firms in their methods of calculating overtime premia.

APPENDIX C. *Occupational earnings*

TABLE C1. *Earnings, etc., by Occupation in June 1953*

Occupation	*Nos. employed*		*Average weekly earnings*					*Average hourly earnings (s.)*				
	thousands	*% of piece-wrkrs.*	time-w'krs.	piece-w'krs.	*piece-w'krs.' differential*	time- and piece-wrkrs. combined	*skill differential*[1]	time-w'krs.	piece-w'krs.	*piece-w'krs.' differential*	time- and piece-w'krs. combined	*skill differential*[1]
Toolroom fitters	30.6	31.0	234/7	239/4	*102.0*	236/1	*107.4*	4.913	5.004	*101.6*	4.941	*108.9*
Sheet metal workers	13.5	77.1	206/11	237/6	*114.8*	230/6	*104.8*	4.382	5.211	*118.9*	5.016	*110.5*
Loose-pattern moulders ...	15.5	74.9	187/11	218/10	*116.5*	211/1	*96.0*	4.111	4.960	*120.7*	4.742	*104.5*
Turners and machinemen rated above fitters	80.2	75.7	203/11	225/7	*110.7*	220/4	*100.2*	4.243	4.731	*111.5*	4.612	*101.6*
Patternmakers	7.9	54.0	215/9	218/6	*101.3*	217/3	*98.8*	4.651	4.665	*100.3*	4.659	*102.6*
Fitters	106.4	64.3	208/7	226/1	*108.4*	219/10	*100.0*	4.225	4.719	*111.7*	4.539	*100.0*
Platers, riveters, caulkers ...	11.9	74.3	204/–	224/1	*109.8*	218/11	*99.6*	4.153	4.680	*112.7*	4.541	*100.0*
Turners and machinemen rated below fitters	80.4	86.0	172/1	200/4	*116.4*	196/4	*89.3*	3.595	4.357	*121.2*	4.246	*93.5*
Labourers	89.9	21.3	163/4	178/7	*109.3*	166/7	*75.8*	3.249	3.588	*110.4*	3.320	*73.1*
All above workers	436.3	60.1	190/1	216/2	*113.7*	205/9	*93.6*	3.870	4.579	*118.3*	4.289	*94.5*

[1] *I.e.* earnings as percentage of fitters'.

APPENDIX D

District Associations by area

The following are the Federation's district associations, as grouped into areas[1] :—

Area	*Associations*	
Western	West of England	South Wales
Southern	London (outside)	
London	London	
West Midlands	Birmingham Burton Coventry	North Staffs. Shropshire
East Midlands	Derby Leicester	Nottingham Sheffield
Eastern	Bedfordshire Cambridge East Anglia	Lincoln Peterborough
Lancashire and Cheshire	Birkenhead Blackburn Bolton Burnley Chester Liverpool	Manchester Oldham Preston Rochdale St. Helens Wigan
Yorkshire	Bradford Halifax Heavy Woollen Huddersfield	Hull Keighley Leeds Wakefield
North-West Coast	Barrow	Border Counties
North-East Coast	North-East Coast	
Scotland	Aberdeen Dundee	Kilmarnock Scottish
Northern Ireland	Belfast Marine	Northern Ireland

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[1] Some discussion of the precise boundaries of these areas, together with a map, will be found in *Earnings in Engineering*, BULLETIN, June 1951.

APPENDIX E

‘ *Relative concentration* ’

The purpose of Tables XV and XVI was to eliminate from the regional and sectional averages of earnings the effects of relative concentration (see p. 312, n. 1). We began by calculating a set of ‘hypothetical’ regionla averages, which were obtained by weighting the sectional averages by the effective employment[1] found within each individual region in turn. These hypothetical figures show what the regional averages of earnings would have been if there had been, on average, no distinctively regional influence on earnings at all. The deviations of these hypothetical figures from the national average are entirely attributable to variations from region to region in the structure of the industry—thus providing first approximations to that part of the corresponding differences in the actual figures which is due to relative concentration. In order to compensate for the concentration effect, the actual level of earnings was adjusted in each case by the deviation (+ or —) of the hypothetical level of earnings from the overall average.

The same technique could of course be used to correct the pattern of sectional earnings for regional influences; but in calculating hypothetical sectional figures it was clearly better to use the ‘ adjusted ’ regional figures, as these are relatively free from distortions due to sectional influences. From the new hypothetical figures we derived corresponding adjusted sectional figures. These in turn were used to furnish second approximations to that part of the regional average of earnings which was due to concentration—the whole calculation thus entering its second round. On continued repetition of these revisions, the hypothetical and hence the adjusted figures both for regions and sections soon converge[2] upon particular values : it being therefore immaterial whether the initial adjustments were made to the regional or to the sectional figures.

The result of making these particular corrections is to arrive at least squares estimates — in Columns (3) and (6)—of the effect on earnings of working in particular regions and sections. We have, in effect, expressed the deviation of the average earnings in any given region and section from the national average as the sum of three terms :—

R_i, a constant term for all workers in the *i*th region, denoting a component of earnings attributable to the influence of working in that region;

S_j, a constant term for all workers in the *j*th section, denoting a component of earnings attributable to the influence of working in that section, and

e_{ij}, a residual term where R_i and S_j have been chosen in such a way that $\Sigma e_{ij}^2 \times \lambda_{ij}$ (where λ is the number of man-hours worked in each region/section) is as small as possible.

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[1] *I.e.*, by man-hours worked. Man-hours, rather than numbers employed, are the appropriate weights to use since we are dealing with standard-week earnings : the latter are, of course, simply hourly earnings corrected for overtime (and multiplied by a constant 44).

[2] In this type of calculation, three or four rounds suffice for most purposes. The margin of error in Tables XV and XVI is never greater than 3d. and usually very much smaller.

This is the usual way of estimating the effect of two independent causal factors by the least squares method, and a full discussion of the implications of such a treatment can be found in any standard work on the analysis of variance.[1] Here, one might only remark that the basic assumption—that the regional and sectional effects are independent and additive—is, to say the least, 'not proven'. It cannot be tested with any accuracy without a knowledge of the variance of the earnings of individuals in each region/section, and we have therefore not attempted a test on the present data. However, further more detailed data in our possession may allow of a more realistic assessment at a later stage.

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[1] See, for instance, Kendall, *The Advanced Theory of Statistics*, vol. II, chap. 24. The iterative method we have used is described by Stevens, *Statistical Analysis of a Non-Orthogonal Tri-factorial Experiment* (*Biometrika*, 1948), and Yates, *Sampling Methods for Censuses and Surveys* (1st edn., pp. 137–41).

THE SHIPPING BILL FOR BRITISH IMPORTS

The 'Paradoxes of 1952'[1] suggested some of the reasons for fluctuations in the margin between the figures of imports c.i.f. as published in the Trade and Navigation Accounts, and the f.o.b. estimates given in the Balance of Payments White Papers. Since then the Treasury has provided some further details. The position has also been changed by the widespread resumption of private trading. Methods similar to those used in 'The Paradoxes of 1952' are used in the present article, to assess the size of the shipping bill for British imports in the light of the new information and changed circumstances. After allowing for differences in coverage and timing, total insurance and freight appears to have accounted for between about 12 and 15 per cent of the adjusted annual value of imports c.i.f. each year between 1948 and 1953.

It is also possible to show, however, that the greater part of the variations in the margin arose from the changes in the relation between c.i.f. and f.o.b. values for petroleum. When we look at the corresponding margin for all other ('dry cargo') imports, the apparent shipping and insurance bill seems to have been relatively constant in recent years at between 10 and 12 per cent of the total c.i.f. value.

This conflicts with a conclusion reached in an article by Mr. Nevin,[2] after a study of commodities other than petroleum, that 'as a working approximation to the f.o.b. costs of imports a reduction of at least 15 per cent would be considerably nearer to the mark than one by the conventional 10 per cent' of the c.i.f. value.

1. The Comparison of Exporting and Importing Country's Statistics

Clearly it would be valuable to obtain the percentage difference between c.i.f. and f.o.b. costs for imports of each of the major commodities, source by source; but there are grave objections against trying to estimate such differences by comparing figures in the importing and exporting country's statistics.

(*a*) This method cannot be generally applied. Clearly it cannot be used where the classification differs in the two returns[3], and even where the classification is the same the quantities recorded may be so widely different that it is obvious that the returns do not cover the same flow of goods.[4]

(*b*) If, because the flow of trade is regular, or by chance, the quantities shown in the exporting and importing country's returns are similar, it may appear that f.o.b. and c.i.f. values recorded can be compared without any adjustment for a time-lag in shipment. Such a procedure is, however, open to objection if prices have changed. If prices have risen, for example, the c.i.f. value of imports shown in the importing country's returns will be lower than the c.i.f. value of corresponding categories of goods in the exporting country's statistics. A direct comparison would, therefore, understate the c.i.f. margin on these goods. This objection will be particularly serious if trade is seasonal, and the season overlaps the end of the year.

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[1] D. Seers and D. G. Holland, Bulletin Vol. 14, Nos. 11 and 12.

[2] *A Note on the Valuation of British Imports*, Bulletin, Vol. 16, No. 1.

[3] Differences of coverage should however be reduced by the adoption of the S.I.T. Classification used by Mr. Nevin.

[4] This is particularly likely in the case of the United Kingdom as the British Trade Accounts relate to general trade, i.e. all merchandise coming from external territories; and therefore include 'disguised transit' goods. See page 331 below.

(*c*) A further difficulty arises because a comparison is made between values filled in by different individuals, possibly with a very different bias. Where export taxes exist (e.g. in France and the Netherlands) the exporter may have an incentive to undervalue exports. This incentive is of course much stronger if undevaluing exports provides a means of evading exchange control and acquiring foreign currencies. It has been rumoured that the exports of some O.E.E.C. countries, as well as those shown in the more obviously dubious statistics of areas like the Middle East, have been undervalued for this reason.

(*d*) A special difficulty arises when Canadian export statistics are used. Canadian exports are valued at the actual amount received by the exporter in Canada, i.e., f.o.b. at the original point of shipment.[1] This would seem to explain the higher apparent c.i.f. margin noted by Mr. Nevin for imports from Canada than on similar imports from the U.S.A.

The last two objections have suggested ways in which Mr. Nevin's method may tend to overstate the true difference between c.i.f. and f.o.b. values, even on the commodities he has studied. Furthermore, it is extremely difficult to ensure that a selection of imports from a few areas will be at all representative of total imports from all areas. Generalisations about the margin on all imports based on the margin for a small number of commodities must be hazardous.[2] For all these reasons Mr. Nevin's method of estimating the cost of freight and insurance is not very satisfactory. In the following section we shall suggest a more reliable, though still very tentative, method of assessing the shipping and insurance costs of British imports.

2. The Apparent Annual Shipping Bill for British Imports 1947–1953

The annual bill for freight and insurance on British imports can be estimated from the difference between the f.o.b. figures published in the White Paper, and the c.i.f. values given in the Trade and Navigation Accounts, if we can allow for differences of coverage and timing between the two sets of figures. It will be seen however, that the adjustments which we can make are crude and incomplete.

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[1] O.E.E.C. *Definitions and Methods* (1951). The inland freights on exports excluded by this valuation was equal to about 4.6 per cent of the recorded value of exports in the period 1946–50.

[2] In Mr. Nevin's study the commodities covered for the United States and the O.E.E.C. countries are by no means representative of imports from these areas. So that even his conclusion that 'on average, the c.i.f. values of imports from O.E.E.C. countries have to be reduced by at least 15 per cent in order to obtain an approximate f.o.b. valuation, while those of imports from North America need to be reduced by at least 20 per cent' is open to question.

It must also be borne in mind that the White Paper f.o.b. figures contain elements of estimation. The f.o.b. values of imports on private account from the Sterling Area, for example, are derived from the Trade and Navigation Accounts by making adjustments, commodity by commodity and source by source, to eliminate differences of timing and coverage, and to subtract freight and insurance payments. The progressive return to private trade has increased the proportion of imports for which such adjustments have to be made : previously the records of Government purchasing departments provided valuable information on f.o.b. payments. And even where Exchange Control records are available, there is more chance of the payments recorded including shipping and insurance costs now that imports tend to be paid for on arrival. The White Paper estimates may therefore be biased upwards by the inclusion of some freight and insurance.

Difference of coverage

The White Papers show the best available estimates, however, of the f.o.b. value of goods passing into British ownership during the year. With certain exceptions, the Trade Accounts show the value of goods passing across British frontiers, and they therefore include as imports some goods which have not changed ownership or have not come into British ownership. Since the ' Paradoxes of 1952 ' was published, the Treasury has provided details of specified differences of coverage.[1] These are shown in Table I. But they do not include all coverage differences.

Thus the Trade and Navigation Accounts figures include certain imports which have not been paid for out of British funds. The most obvious items which we do not pay for—such as equipment imported under the Mutual Defence Agreement, goods imported for foreign Embassies and Commonwealth and Foreign Government forces (including American P.X. stores)—are excluded from the Trade and Navigation Accounts. But imports ordered and paid for by other foreigners resident in this country may be included. More important, imports in the Accounts include a category sometimes called ' disguised transit '—duty free goods entered in the Returns although in transit on through bills of lading (other than transhipments under bond).[2] These are not of course paid for by any British resident but by the final foreign buyer. Again commercial imports of British firms may include samples, goods sent here on credit, etc. Some imports may be gifts. Altogether, it may well be that in some years the Trade and Navigation Accounts overstated the imports paid for by at least as much as they understated their value owing to the specified differences of coverage shown in Table I. But we cannot make any firm estimate of the magnitude of unspecified coverage differences and the only adjustment made in Table I

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[1] Imports from the Channel Islands and landings of British owned whaling vessels are excluded from, and imports of diamonds, silver, partly worked gold and all kinds of second-hand ships are added to, the Trade and Navigation Accounts figures.

[2] In 1937 the value of such goods was equivalent to 12–15 per cent of the total of re-exports. O.E.E.C. *Definitions and Methods*, 1951.

TABLE I

A reconciliation of c.i.f. import values from Trade and Navigation Accounts with f.o.b. values given in Balance of Payments White Papers

£ million

	1947	*1948*	*1949*	*1950*	*1951*	*1952*	*1953*
(*a*) Imports c.i.f. (Trade and Navigation Accounts)	1,795	2,078	2,275	2,608	3,904	3,479	3,345
(*b*) Differences of coverage ...							
(i) Specified in White Papers	+11	+ 3	+ 4	+20	+32	+46	+35
(ii) Gift of Canadian aircraft	...	...	...	...	...	...	—35
(*c*) Estimated adjustment for difference of timing[1] ...	+40	+14	+14	+91	+38	—44	— 9
(*d*) Imports c.i.f. (adjusted)	1,846	2,095	2,293	2,719	3,974	3,481	3,336
(*e*) Imports (f.o.b.) (White Paper)	1,560	1,794	1,978	2,383	3,475	2,943	2,872
(*f*) Difference (*d*)–(*e*)	286	301	315	336	499	538	464
(*g*) Effect of postponement of payments by resumption of private trade[2]	—	—	—	—14	—14	— 9	—31
(*h*) Difference due to insurance and freight and coverage differences not estimated	286	301	315	322	485	529	433
(*i*) Adjusted c.i.f. margin, (*h*) as per cent of (*d*)	*15.5*	*14.4*	*13.7*	*11.8*	*12.2*	*15.2*	*13.0*
(*j*) Crude margin (*a*)–(*e*) as per cent of (*a*)	*13.1*	*13.7*	*13.1*	*8.6*	*11.0*	*15.5*	*14.1*

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[1] Assuming an average timelag of one month in 1947–9; after that the comparable figures would have been 1950 + 97, 1951 + 58, 1952 —61, 1953 —8. But as goods returned to private trade in previous years were paid for mainly on arrival the timelag has been adjusted accordingly.

[2] See page 334.

for these differences is to subtract the value of Canadian aircraft received as a gift in 1953.[1] We can only say that in so far as the Trade and Navigation Accounts overstate the c.i.f. value of imports actually paid for there is likely to be an appreciable error in assuming that the difference between c.i.f. and f.o.b. values represents only the cost of shipping and insurance. This error is not likely to occur in the case of petroleum, so that the whole overstatement is concentrated on the apparent shipping bill for dry cargo imports.

Differences of timing

In the Balance of Payments figures, imports and exports are recorded as far as possible when the change of ownership takes place. In the latest White Paper,[2] however, it is admitted that ' In practice, owing to lack of information, this cannot be done accurately; and for the greater part of imports payments data are used. The relationship of the time of payment for imports to the time of their arrival in the United Kingdom is known to vary considerably between different commodities in the same period and from one period to another for the same commodities '.

Over the early part of the period 1947–1953 it was stated that for a large proportion of imports, the change in ownership occurred in the country of origin either before or at shipment.[3] This was the basis of the average timelag of three weeks assumed in the ' Paradoxes of 1952 '. Obviously, any such overall adjustment for a difference in timing can only be very approximate, as the average will vary with any change in the proportion of goods coming from different sources, as well as any changes in the delays before shipment. The time in shipment varies from about two months for goods from Australia and East Africa and one month for goods from West Africa, to two weeks for imports from the United States and Canada and a negligible period for imports from Western Europe and Eire. In view of the uncertainties involved, and of changing circumstances which, as we shall see, have tended to reduce the period between payment and arrival of imports, it scarcely seems worth estimating the effect of a three weeks' timelag, instead of working with a difference of one month taken direct from the Trade Accounts. We can first see how much difference an average timelag of one month could have made and use it as an outside limit—later adjusting, as far as we can, for changing circumstances. Table I shows[4] that a month's difference in timing would have had little effect in 1948, 1949 and 1953; but that in 1947, 1950 and 1951 imports paid for would have been appreciably greater than those arriving during the calendar year, and that by contrast in 1952 they would have been appreciably smaller than arrivals.

There are two principal reasons why the timelag may have lessened over this period. The ending of shipping shortages was tending to reduce delays before shipment in the period up to about 1950. Since then the gradual return to private purchase has meant that many important commodities which were paid for by H.M. Government on or before shipment have come to be paid for largely on or after arrival.[1]

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[1] See *Economic Survey for 1954*, Table 2. Stores for naval, military and air forces carried on British Government vessels are not normally included in the Trade Accounts.

[2] Cmd. 9119.

[3] See Cmd. 8808 etc.

[4] In line (*c*) and footnote 1.

Changes in the time of payment in relation to the time of arrival in this country will affect the difference between the White Paper figures and those of the Trade Accounts. When payments are postponed by changes in trade practices (such as the restoration of private trade), credit policy, or sentiment about exchange rates, the difference between the two sets of figures will be increased.[2] For example, if the imports of a certain commodity are regular and an average timelag of one month between payment and arrival disappears in the course of the year, only eleven months imports of that commodity will be paid for within the year. For most commodities the change back to private trade was equivalent to an extension of credit for at least the average time of shipment—for example, credit equivalent to two months' imports of copper in 1953, or of tea in 1951. It is very difficult to make any accurate adjustments for this factor, but we have made a rough shot at it.[3]

Table I shows that if the unknown coverage differences had increased with the total value of imports, freight and insurance costs would have fallen gradually as a percentage of the c.i.f. value until 1950, and would have risen slightly in 1951 and sharply in 1952, and fallen back, but not to the 1951 proportion, in 1953. By contrast, the crude difference between the (unadjusted) Trade Accounts and White Paper figures was a more or less constant proportion of the Trade Accounts figure until it dropped precipitately in 1950 (to less than 9 per cent), and it rose more sharply thereafter than the adjusted figures. Thus the adjustments for differences of coverage and timing convert the sharp break in 1950 into part of a gradual trend, and reduce, but by no means eliminate, the sharp rise in the crude margin in 1952.

3. The Apparent Shipping Bill for Petroleum

Perhaps the most striking change in the composition of British imports over this period was the growth in the tonnage of petroleum imports and of its share in the total tonnage of imports.[4]

The shipment of petroleum differs radically from that of other imports because specialised tanker fleets are employed, most of which are either owned by the petroleum companies or time chartered by them. Consequently the distinction between f.o.b. and c.i.f. values is less ' real ' and more a matter of internal book-keeping practices than is the case for dry cargo imports. As it is to be suspected that the share of shipping cost in the c.i.f. value is different for petroleum and for dry cargo imports, the growth of petroleum imports

[1] This statement is taken from Cmd. 9119. The value of the imports of goods returned to private trade during the year totalled about £340 million in 1950, 98 in 1951, 62 in 1952 and 419 in 1953.

[2] The opposite is true if, for example, credit is restricted.

[3] Study of the commodities returned to private trade suggests that the changeovers during the year might have reduced the payments made for imports as shown in line (*g*) Table I. In 1950 the changeovers mainly affected imports from O.E.E.C., hence the reduction was relatively small.

[4] It was just over one-fifth of the total in 1949 and nearly 40 per cent in 1953.

might account for some of the changes in the overall freight and insurance percentage. Fortunately the f.o.b. value of petroleum imports is shown separately in the White Papers, and we can compare this with the c.i.f. value given in the Trade Accounts.

TABLE II

The apparent cost of freight and insurance for petroleum and other imports

	1948	*1949*	*1950*	*1951*	*1952*	*1953*
(*a*) Petroleum c.i.f. value (Trade Accounts) £m.	154	147	194	300	338	311
(*b*) Petroleum f.o.b. value (White Paper) £m.	128	121	143	195	181	198
(*c*) Apparent cost of freight and insurance for petroleum £m.	26	26	51	105	157	113
(*d*) Apparent cost of freight and insurance for all other imports[1] £m.	277	289	271	380	372	320
(*e*) Apparent cost of freight and insurance as per cent of c.i.f. values						
(i) Petroleum[2]	*16.9*	*17.7*	*26.3*	*35.0*	*46.4*	*36.3*
(ii) Other imports[3]	*14.2*	*13.5*	*10.7*	*10.3*	*11.8*	*10.4*
(iii) All imports[4]	*14.4*	*13.7*	*11.8*	*12.2*	*15.2*	*13.0*

[1] Line (*h*) from Table I less (*c*) above.
[2] Line (*c*) above as per cent of (*a*) above.
[3] Line (*d*) above as per cent of value of dry cargo imports, i.e. (line (*d*) from Table I less line (*a*) above). Canadian aircraft included in 1953.
[4] Line (*i*) from Table I.

Table II shows the striking contrast between the *threefold rise* in the share of freight and insurance in the c.i.f. cost of petroleum imports between 1948 and 1952, and the *fall* of freight and insurance in the c.i.f. value of other imports. In 1951 the increased freight and insurance on petroleum more than offset the fall in the margin on other cargoes, and caused a rise in the overall margin. The sharp rise in the overall margin in 1952 was due to a further increase in the petroleum margin coupled with an increase in the margin on dry cargoes. Had there been no change in petroleum imports or the petroleum margin after 1950 the overall margin would have been 11.1 per cent in 1951, 12.7 in 1952 and 11.5 in 1953.

The increase in the total cost of freight and insurance for petroleum imports can be explained by the increasing tonnage, and by the higher freight rates after 1949. These seem to account for most of the rise in the average cost of freight and insurance per ton after 1949, except in 1950. The disproportionate rise in that year was probably due partly to the effect of devaluation in raising the sterling cost of dollar freights, and partly to the extremely sharp rise in the proportion of Middle East oil.[1], [2]

The changes in the petroleum *margin* are, however, only partly accounted for by changes in the cost, per ton, of shipment. There were also important changes in the composition of petroleum imports over this period which influenced the c.i.f. value of petroleum imported. Table IV shows that the average f.o.b. value of petroleum has been falling since 1950, and that in 1953

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[1] Which requires a longer haul and payment of Suez Canal dues ; or the use of capital-costly pipelines to the Mediterranean. (The British-owned I.P.C. pipeline from Kirkuk to Tripoli came into operation in 1950, but it was small in comparison with the American-owned Tapline, which came into operation the following year, and the I.P.C.'s line to Banias, which only came into use in 1953.)
[2] See Tables III and V.

TABLE III

Petroleum shipping and insurance costs, 1948–1953

	1948	*1949*	*1950*	*1951*	*1952*	*1953*
(*a*) Apparent cost of freight and insurance (£m.)	26	26	51	105	157	113
(*b*) Tonnage of imports (m. tons)	17.2	17.7	18.9	27.1	30.1	33.2
(*c*) Apparent average cost per ton of freight and insurance (£)	1.5	1.45	2.7	3.9	5.2	3.4
(*d*) Index of (c), 1950=100	56	54	100	144	193	126
(*e*) Index of tanker freights[1] 1950=100 ...	n.a.	90[2]	100	167	220	121

[1] Source : *Petroleum Press Service* October 1953, p. 352. The index is based on regular assessments of time charter rates for the following six months made by a panel of London tank shipbrokers. For details, see *Petroleum Press Service*, April and October 1951.

[2] As the index is based on the London market, the rise between 1949 and 1950 does not reflect the higher sterling cost of $ freights resulting from devaluation.

the c.i.f. value per ton of petroleum imported was substantially lower than it had been in 1950, even though the cost of shipment was higher. It was the fall in the f.o.b. value in conjunction with the rise in shipping costs which caused the enormous increase in the petroleum margin between 1950 and 1952.

TABLE IV

Average costs, £ per ton, of petroleum imports

	1948	*1949*	*1950*	*1951*	*1952*	*1953*
Average f.o.b. value per ton	7.4	6.8	7.55	7.2	6.0	5.95
Average freight and insurance per ton	1.5	1.45	2.7	3.9	5.2	3.4
Average c.i.f. value per ton	8.9	8.25	10.25	11.1	11.2	9.35

The fall in the average f.o.b. value of imported petroleum reflects, of course, the rapidly growing proportion of the less costly crude in total petroleum imports. Table V sets down the principal changes in composition of petroleum imports.

TABLE V

Changes in composition and cost of petroleum imports

	1948	*1949*	*1950*	*1951*	*1952*	*1953*
Composition (*per cent of petroleum tonnage*) ...						
Middle East crude[1]	18	28	43	57	74	74
Other sources[2] crude	3	2	1	3	3	7
Other sources[2] processed crude	6	5	6	4	3	
Refined petroleum	73	65	50	36	20	19
Cost (*£ per ton c.i.f.*[3])						
Middle East crude	6.8	7.0	8.2	9.7	10.5	8.5[4]
Other sources[2] crude	7.1	6.9	9.7	12.4	10.6	n.a.
Other sources[2] processed crude	4.9	6.2	5.0	7.8	8.5	n.a.
Average, all crude imports	6.8	6.5	7.8	9.2	9.9	8.1
Refined petroleum	9.9	9.3	12.8	14.5	15.8	14.4

Source : *Annual Statements of the Trade of the United Kingdom.*

[1] There were no 'processed crude' imports from the Middle East until 1950, and they accounted for less than 1 per cent in that year, when they were most important.

[2] Most of the crude from other sources was Venezualan. Processing is carried out at Curaçoa.

[3] There are no figures for average f.o.b. values per ton by type of oil. That of Middle East crude was certainly lower than either refined petroleum or crude from other sources. The cost of shipping per ton was lowest per ton of processed crude from other sources.

[4] Approximate.

4. The Apparent Shipping Bill for Dry Cargo Imports

The smaller variations in the percentage of freight and insurance on dry-cargo imports require less explanation. The gradual decrease until 1950 is what we might expect from the increasing active tonnage of dry cargo shipping. The somewhat sharper fall in 1950 than in other years may reflect the greater effect of devaluation on dry cargo import prices than dry cargo freight rates. The decline between 1950 and 1951, and the rise between 1951 and 1952, are more surprising. Between 1950 and 1951, at least partly because of the greatly increased tonnage of trade, freight rates increased.[1] But this was also a period in which import prices, particularly of raw materials, rose extremely rapidly, and in some cases no doubt outstripped the increase in freight rates. This in itself would tend to cause a fall in the c.i.f. margin. In addition, there was a very substantial increase in the tonnage of manufactures imported into this country,[2] and the low shipping cost in relation to the value of these imports would also tend to reduce the c.i.f. margin. In 1952 the sharp fall in import prices, and the shift in the composition of imports towards heavier but less valuable goods, were responsible for the increase in the margin despite lower freight rates.

5. Conclusions

(i) The variation in the percentage difference between the f.o.b. values of imports in the White Paper and the c.i.f. values recorded in the Trade Returns can be reduced by making appropriate adjustments for differences of coverage and timing.

(ii) The variations in the *adjusted* c.i.f. margin after 1950 can largely be explained by the growing importance of petroleum imports, and the striking changes in the margin on petroleum, arising from the increasing proportion of crude imports and fluctuations in tanker freights.

(iii) In recent years the c.i.f. margin for other (dry cargo) imports seems to have been fairly stable at 10–12 per cent of the adjusted c.i.f. value of imports. The minor variations can be attributed to changes in the composition of imports, and to divergent movements in freight rates and import prices.

Anne Romanis.

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[1] The tramp freight index, because of its very restricted coverage, should only be used as an indication of the *direction* of change of freight rates in general. It is likely that the actual changes in the tramp index will substantially exaggerate the changes in all dry cargo freight rates. The tramp index moved as follows: 1950, 100; 1951, 207; 1952, 132; 1953, 102.

[2] The tonnage of imports of manufactures rose by 40 per cent between 1950 and 1951. See figures published in the *Annual Reports of the Liverpool Steam Ship Owners' Association.*

CHANGE OF PUBLICATION DATE.

From January 1955 the BULLETIN will be published quarterly in February, May, August and November. Each number will contain about 100 pages.

The subscription will remain at 30s., and should be sent to the publisher, Basil Blackwell, Broad Street, Oxford.

ERRATUM

BULLETIN, Vol. 16, Nos. 7 & 8.

'The recent United States reccssion and the strength of primary product prices.' *W. Beckerman.*

Page 263, line 20, should read: 'From the second quarter of 1951 to the second quarter of 1953, Western Europe's terms of trade improved by no lees than 23 per cent. . . .'